International Islamic University Chittagong

Department of Electrical and Electronic Engineering

Syllabus

For 4 years B.Sc. Engineering Degree in Electrical & Electronic Engineering

Spring-2021

As per recommendations made in the meeting of the Syllabus and Course Offering Committee of the Department of EEE held on July 06, 2021.

As per recommendations made in the meeting of the Committee of Courses of the Department of EEE held on August 21, 2021.

As per recommendation made in the 141st meeting of Faculty of Science and Engineering Committee held on October 16, 2021.

As per recommendation of the 44th Academic Council meeting held on October 31, 2021 and duly approved in the 239th Syndicate meeting held on November 04, 2021.

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International Islamic University Chittagong
Faculty of Science and Engineering
Department of Electrical and Electronic Engineering

1. The Vision, Mission, Objectives and Motto of the International Islamic University Chittagong (IIUC)

1.1 Introduction: International Islamic University Chittagong (IIUC) is one of the top graded government-approved private universities in Bangladesh. Having fulfilled the requirements as laid down in the Private University Act of 1992, and after obtaining the necessary clearance from the University Grants Commission (UGC), and the permission of the Government of Bangladesh (GOB) through the Ministry of Education, **International Islamic University Chittagong (IIUC)** started functioning on **February 11, 1995**. The credit for the idea of establishing this University goes to Islamic University Chittagong Trust (IUCT).

IIUC framed its Statutes, Ordinances, and Regulations governing IIUC's key activities - academic, administrative, financial, student welfare, discipline, etc. as per the **Private University Act, 1992, 1998, and revised Act, 2010.** Most statutory bodies formed under the provisions of the Act have since then been functioning.

1.2 The Visions of the University are:

i. to offer nationally competitive & internationally recognized opportunities for learning to make IIUC as the Centre of Excellence in different areas of scholarship.
ii. to keep its door is open to the admission seekers from all over the world, regardless of race, region and religion.
iii. to cherishes the dream of becoming one of the highest seats of learning & creator of knowledge in the South East Asia.

1.3. **The Mission of the University**:

Number of Missions	The **Missions of the International Islamic University Chittagong** (IIUCMS) are to
IIUC MS-1	produce through the pursuit of education properly trained up manpower to contribute to socio-economic development & moral upliftment of the society
IIUC MS-2	cultivate in students expertise as well as ethical sensitivity and intelligence,
IIUC MS-3	have an ability to think independently beyond their areas of study, so that they can sustain justice in all walks of life.

1.4 The objectives of the University are to

i. create a new generation of competent youths, who will be equipped with academic excellence, professional expertise and adorned with moral height.
ii. follow a policy of continued Modernization of Knowledge and academic curricula in different disciplines of education so that its students can imbibe the true spirit of religious value as an effective guiding principle in their profession and daily life.

1.5 The Motto of IIUC is to "**Combine Quality with Morality."**

2. Teaching Methods and Policy of IIUC:

2.1 Methods: *Outcome–based education (OBE) and Bi- Semester system of Continuous Quality Improvement (CQI) through self-examination and external review.* In this process, students are evaluated throughout a course rather than exclusively by examination at the end. It is multidimensional based on students (a) attendance in the Classes, (b) performance in Assignments and Class Tests, (c) Scores in the Mid-Term, and the Final Examination (d) Lab. Reports, (e) Thesis/ Project/ internship, (f) Seminar/Presentations (g) Viva-voce, (f) Industry visits (g) Co-Curricular and Extra-curricular activities.

2.2 Policy: The University is committed to the life-long success of students in its undergraduate and master's programs through high-quality instruction and learning experiences. IIUC has **an Integrated Education Policy**, where a student achieves holistic learning through awareness of his surroundings and other relevant knowledge bases. IIUC emphasizes the diffusion of scientific, technical, and professional knowledge on the one hand, & building up of character in youth by making religion and ethics an integral part of education on the other. In this regard, there are some courses for the students of all Faculties at IIUC. These are not a part of the Departments' main curriculum, but those are named as **University Requirement Courses (URC).**

2.3 Morality Development Program (MDP): IIUC incorporates studies on the values of mutual respect & peaceful co-existence in the courses under the "**Morality Development Program (MDP),**" which includes all students of the university irrespective of caste, creed, or religion.

2.4. Co-Curricular and Extra-curricular activities: IIUC supports student participation in a broad array of *Co-Curricular and Extra-curricular activities* as an integral component of its commitment to student life and success. These programs mainly include leadership training, cultural, environmental, recreational, and social activities, debating & public speaking programs, intellectual discussions, games & sports, excursion, and study tours home & abroad to complement academic pursuits. Through these programs, students earn the capacity to express themselves properly, maintain the personality, and learn to respect people of other faiths through mutual understandings among various regions, religions, beliefs, and cultures. All Co and Extra-curricular activities are run by the clubs named after the Departments such as EEE club, Computer club, Business club, etc. under the close supervision and monitoring of the competent authority.

2.5 Student Advisor: IIUC provides Academic Guidance and Counseling Service by the Student Academic Advisor of a section of students each semester. The students' Academic Guidance and Counseling Service is an integral part of the academic program of IIUC students. Its objective is to guide students to obtain the best results, adapt to the university environment, and take advantage of their opportunities and solve individual problems through counseling. A special arrangement has been made for Academic Guidance and Counseling at the University, in each department of IIUC, to provide academic career and student welfare counseling by the Student Adviser of the respective section of students under each semester, i.e., section adviser is the Student Academic Advisor for Academic Guidance and Counseling (Ref: the 207th Syndicate Meeting held on 27.01.2018). The Academic Adviser shall specify at least two periods a week that will be displayed in their timetable and ensure that they are available at their offices in specific periods to enable them to meet their advisers. The student adviser shall maintain a file for the students advising record each semester.

Students Affairs Division (STAD) and Job Placement Centre (JPC) of IIUC also helps the students, which covers (a) group and individual counseling, (b) career and job placement, (c) preserving CVs of the graduates, (d) advising & helping students to solve their career-related problems, etc.

3. Names of the Degree, Faculty offering the program and Department offering the Program

3.1 **Name of the Degree**: Four years Bachelor Program of Bachelor of Science in Electrical and Engineering. Degree Program. The abbreviation of the degree is **B.Sc. (Engg) in EEE**. Graduates at this level will have advanced knowledge and skills for professional/highly skilled work and or further learning.

3.2 **Name of the Faculty offering the Program**: The Faculty of Science and Engineering **(FSE).**

3.3 **Name of the Department offering the Program**: The Department of **Electrical and Electronic Engineering (EEE).**

4. The Mission, Vision and Objectives of the Faculty of Science & Engineering

4.1. The Mission of the Faculty of Science and Engineering:

The mission of the Faculty of Science and Engineering (FSE) is to foster excellence in teaching, research, and learning within a systems approach to science and engineering education. Our goal is to produce engineering graduates with both a strong base of technical knowledge and the complementary skills needed to be successful professional engineers in the modern world.

4.2. The Vision of the Faculty of Science and Engineering:

The vision of the Faculty of Science and Engineering is to be a dynamic center of innovation and creativity dedicated to teaching, learning, professionalism, research, entrepreneurship, and partnership with local and global communities. The aims of the Faculty are to provide international standard quality programs of undergraduate and graduate education, be an active research unit advancing the knowledge of science and engineering and serve the community and industry as an agent of technological and educational innovation and advancement.

4.3. The Objectives of the Faculty of Science and Engineering:

The Faculty plans to achieve its vision and mission through the pursuit of the following specific objectives. The objectives are

- **F1:** To prepare graduates for personal and professional success with an awareness of and commitment to their ethical and social responsibilities, both as individuals and team environments.
- **F2:** To enable graduates to keep on self- development throughout their careers.
- **F3:** To produce graduates with the necessary background and technical skills to work professionally and fulfill the need of the industry.
- **F4:** To organize, in collaboration with stakeholders, conferences, symposia, and workshops to upgrade technical levels in Science and Engineering.
- **F5:** To carry out and publish academic knowledge.
- **F6:** To initiate activities to promote research innovation, commercialization, and Entrepreneurship Increase.

5. Vision and Mission of the Department of Electrical and Electronic Engineering (EEE)

5.1 The Vision of the department

The vision of the department is to produce comprehensively trained, socially responsible, innovative electrical engineers and researchers of high quality who can contribute to national and global development.

5.2 Mission of the department:

The Dept. of EEE supports the mission of the International Islamic University Chittagong (IIUC) through an academic environment with a strong theoretical foundation, practical engineering skills, experience in interpersonal communication and team work along with an emphasis on ethics, professional conduct, and critical thinking. Further, the graduates will be trained to have successful engagement in research and development and entrepreneurship. The department invokes the desire

and ability of lifelong learning in the students to pursue a successful career in engineering. In short, the departmental mission can be stated as follows:

MS-1: Strong theoretical foundation to have the life-long learning
MS-2: Practical engineering skill for successful career in engineering
MS-3: Experience in interpersonal communication
MS-4: Teamwork along with ethics, professional engagement and critical thinking
MS-5: Engagement in research, development and entrepreneurship.

F-I: Mapping between Mission of the University and departmental Mission Statements (MSs)

Mission of the department	Institutional missions		
	IIUC MS-1	IIUC MS-2	IIUC MS-3
MS-1	✓	-	-
MS-2	-	✓	-
MS-3	-	✓	-
MS-4	✓	-	✓
MS-5	✓	-	✓

6. Description of the Programs

The B.Sc. (Engineering) program in the Electrical & Electronic Engineering department consists of 77 courses carrying **162 Credit Hours**. There are 9 University Requirement Courses (URC) with 13 credit hours, 4 Interdisciplinary Courses with 8 credit hours, 11 Basic Science Courses carrying 26 credit hours, 41 core courses carrying 86.5 credit hours, and 12 Elective Courses carrying 28.5 credit hours. A total of **162** credit hours have to be undertaken and completed by a student during 8 semesters. The duration of each semester is 6 months. Each course carries 100 marks. There are 50 marks for Continuous Internal Evaluation (CIE) and 50 marks for Semester End Examination (SEE). Assessment pattern for CIE and SEE are as follows:

A. Assessment Pattern for theory courses: A sample question assessment pattern for a theory course is given in Table 6.1 to show the relationship among Bloom's category and CIE and SEE.

Table 6.1: A Sample Question Assessment Pattern (Theory courses)

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation etc.
ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term and Final Exam, Project evaluation and Viva, etc.

B. **Assessment Pattern for Sessional Courses**: There are 100 marks for each Sessional course. Out of 100 marks, 50-60 marks are allotted for continuous assessment on Lab. activities, including 10 marks for attendance (**CIE**) and 40-50 marks is for a practical exam in the form of the viva, quiz, etc. at the end of semester final examination (**SEE**).

7. Program Educational Objectives of B.Sc. in Electrical and Electronic Engineering

The Program Educational Objectives (PEOs) or goals are the statements that describe the expected achievements of graduates within the first few years of their graduation from the program. The program objectives are guided by global and local needs, the institution's vision, long-term goals, etc. The program objectives are expected to continuously evolve in agreement with local employers, industry, R & D advisors, and alumni. **Program Educational Objectives (PEOs)** of B. Sc in EEE at IIUC are as follows:

	Topics	**Program Educational Objectives (PEOs)**
PEO-1	**Success in Electrical Engineering Fields**	To provide students with the knowledge of Basic Sciences in general and Electrical and Electronics Engineering, in particular, to acquire the necessary skills for analysis and synthesis of problems in electrical and electronic engineering.
PEO-2	**Industrial awareness & research**	To provide technical knowledge and skills to identify, comprehend, and solve complex industry and research tasks and inspire the students to become future researchers, scientists with innovative ideas.
PEO-3	**Successful employment & professional ethics**	To prepare the students for successful employment in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen to handle critical situations and meet deadlines.
PEO-4	**Being a leader in professional & societal environment**	To train the students in basic human and technical communication skills to be good team members, leaders, and responsible citizens.

These PEOs are quite broad by intention, as **Electrical and Electronic Engineering** graduates may seek further education or work in diverse areas. To make these PEOs meaningful, they will demonstrate the following performance, actions, or achievements.

- Following indicators are considered as a demonstration of **PEO-1:** Students will establish themselves with the knowledge of Basic Sciences in general and Electrical and Electronic Engineering, in particular, so as to acquire the necessary skills for analysis and synthesis of complex engineering problems that may be demonstrated by any of the following:
  a. Acceptance and satisfactory progress by students in a graduate degree program.
  b. Formulating and solving moderately complex electrical and electronics engineering problems.
  c. Making practical recommendations and skillful use of state-of-the-art tools for electrical and electronics engineering processes.
  d. Producing, publishing, and reviewing clear written electrical and electronics engineering documentation (papers, reports, and significant parts of proposals).
  e. Participating in the field through public speaking, activity in professional societies/technical associations, etc.

f. Capability to handle societal, ethical (intellectual property rights), legal, business, and technical issues related to a project.

- Following indicators are considered as a demonstration of **PEO-2:** Students will establish themselves with the technical knowledge and skills to identify, comprehend and solve complex tasks in industry and research and inspire the students to become future researchers, scientists with innovative ideas that may be demonstrated by any of the following:

a. Leading or participating in a project, professional society, designed team, team sports, or coaching.
b. Delegating effectively.
c. Effectively handling a situation involving ethics and volunteering in a charitable organization.

- Following indicators are considered as a demonstration of **PEO-3:** Students will establish themselves for successful employment in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to handle critical situations and meet deadlines may be demonstrated by any of the following:

a. Skillfully using tools for project and configuration management, like resource planning systems, software source control systems, etc.
b. Show respect to others and conduct professional duties with high standards of ethics and rationality.
c. Communicating effectively in a group environment and resolving problems encountered in teamwork.
d. Estimating correctly the required resources (time, team, equipment etc.) for Electrical and Electronics Engineering projects.
e. Seeking assistance or elevating problems when necessary.

- Following indicators are considered as demonstration of **PEO-4:** Students will establish themselves for basic human and technical communication skills so that they may be good team-members, leaders and responsible citizen may be demonstrated by any of the following:

a. Successfully completing the graduate course and acquire self-learning capability with a new skill and tools and system.
b. Reading technical books, journals, conference papers, technical reports or standards
c. Engage in life-long learning through continuing education, research, attending a technical conference, symposium or workshop

F-II: Mapping between Program Educational Objectives (PEOs) and departmental mission Statements (MSs)

PEOs	MS-1	MS-2	MS-3	MS-4	MS-5
PEO-1	✓	✓	✓	-	-
PEO-2	✓	✓	-	-	✓
PEO-3	-	-	-	✓	✓
PEO-4	-	✓	✓	✓	✓

F-III: Mapping between Program Educational Objectives (PEOs) and IIUC missions

	Institutional Missions		
	IIUC MS-1	IIUC MS-2	IIUC MS-3
PEO-1	✓	✓	-
PEO-2	✓	✓	-
PEO-3	-	-	✓
PEO-4	-	✓	✓

8. Program Outcomes or Program Learning Outcome of B.Sc. in Electrical and Electronic Engineering

It is the aim of the EEE program to educate engineers who are ready to work actively in the real-world, acquiring high ability in the Electrical and Electronics Engineering discipline. The first two years' basic classes give the students a concrete basis to be Electrical and Electronics Engineering. They begin their professional study from the second year and step up year by year to be highly educated engineers. All the EEE students obtain basic knowledge and basic skills in the Electrical and Electronics Engineering discipline with the undergraduate program's courses. These courses nurture highly educated engineers in power generation and transmission, which have deep knowledge and problem-solving skills in the relevant fields. Our graduates are expected to have a wide range of abilities, including professional knowledge and technical skills in electrical engineering.

Program Learning Outcome or PLOs are abilities that a graduate of Electrical and Electronic Engineering would be able to do at the time of graduation. Relation of Program Learning Outcome with Knowledge Profile (K1-K8), Complex Engineering Problem Solving (P1-P7) and complex Engineering Activities (A1-A5) are describe in the tables 10.1,10.2,10.3 and 10.4. A graduate of EEE will achieve the following PLOs.

PLO-1: Engineering Knowledge: an ability to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.

Performance Criteria Definitions:

- Define/describe pertinent principles, concepts, theories, and/or formulas, as appropriate to complex engineering problems at the level of P1 and A1.
- Knowledge and understanding of scientific principles and methodology necessary to strengthen their education in their engineering discipline, to enable appreciation of its scientific and engineering context and to support their understanding of historical, current and future developments and technologies.
- Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical problems.
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support the study of their own engineering discipline.
- Express confidence in receiving positive rating from employers on this program outcome.

PLO-2: Problem Analysis: an ability to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (K1 to K4).

Performance Criteria Definitions

Practical application of engineering skills through combining theory and experience, use of other relevant knowledge and skills in fulfilling this objective, including:

- Identify appropriate complex engineering problems at the level of P1-P7, and A1-A5.
- Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc.)
- Understanding the use of technical literature and other sources of information
- Awareness of quality issues
- Ability to work with technical uncertainty
- Understanding of engineering principles and ability to apply them to analyze key engineering processes.
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modeling techniques
- Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve complex engineering problems.
- Understanding ability to apply a systems approach to engineering problems

- Demonstrate confidence in problem solving while in employment in industry.

PLO-3: Design / Development of Solutions: an ability to Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations (K5).

Performance Criteria Definitions

Design is the creation and development of an economically viable product, processor system to meet a defined application. It involves significant technical and intellectual skills that can be used, to integrate all engineering understanding, knowledge for the solution of real problems. Graduates will therefore need the knowledge, understanding and skills to:

- Establish objectives of a complex design project specifying knowledge profile (K1-K8), complex problem solving (P1-P7), and complex activities (A1-A5).
- Design solutions for complex engineering problems.
- Manage the design process and evaluate outcomes.
- Knowledge of management techniques which may be used to achieve engineering objectives within that context.
- Understanding of the requirement for engineering activities to promote sustainable development.

PLO-4: Conduct Investigations of Complex Problems: an ability to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Performance Criteria Definitions

Graduates will therefore need the knowledge, understanding and skills to:

- Identify problems or opportunity in engineering field
- Problem formulation and abstraction
- Information and data collection.
- Model translation.
- Implementation and documentation.
- Interpretation of results.

As the most engineers eventually learn, the problem-solving process is never complete. Therefore, a final element here is feedback and improvement.

PLO-5: Modern Tool Usage: an ability to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations (K6).

Performance Criteria Definitions

Graduates will be expert in:

- Wide range of tools needed by engineering graduates in computer software, simulation packages, diagnostic equipment, use of technical library resources and literature search tools.
- Predicting and modeling to complex engineering activities.

PLO-6: The Engineer and Society: an ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice (K7).

Performance Criteria Definitions

The Graduates will

- Have the contextual knowledge of assessing the societal, health, safety, legal and cultural issues in engineering solutions.
- Consideration of non-technical such as societal, health, legal and cultural issues in developing the engineering solution.

- Demonstrate confidence in professional practice in employment and receive positive rating from employers on this program outcome.

PLO-7: Environment and sustainability: an ability to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (K7).

Performance Criteria Definitions

- Focusing the knowledge and interpretation a socio economic, political and environmental issues.
- Obtaining in-depth knowledge on contemporary issue.
- Demonstrate confidence in professional practice in employment and receive positive rating from employers on this program outcome.

PLO-8: Ethics: ability to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (K7).

Performance Criteria Definitions

- Ability to make informed ethical choices and knowledge ability to of professional codes of ethics.
- Evaluates the ethical dimensions of professional practice and demonstrates ethical behavior.
- Achieve High degree of trust and integrity
- Demonstrate that they can respond positively on ethical and professional issues while in employment.

PLO-9: Individual and Teamwork: an ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Performance Criteria Definitions

Graduates will therefore gain

- Maturity – requiring only the achievement of goals to drive their performance.
- Self- direction (take a vaguely defined problem and systematically work to resolution).
- Capability on effective teamwork and project.
- Ability to demonstrated and work with all levels of people in a team in organization.
- Demonstrate that they can respond positively on ethical and professional issues while in employment.

PLO-10: Communication: an ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Performance Criteria Definitions

Graduates will therefore gain the skill of

- Writing technical reports preparing assignments, homework etc.
- Prepare multi-media presentations, posters
- Delivery of oral presentations, participate in technical discussions
- Express confidence that they can communicate effectively while employed in industry.

PLO-11: Project management and finance: an ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Performance Criteria Definitions

- Knowledge of project management principles
- Define and planning of engineering project
- Demonstrate engineering /computing project development phases
- Consideration of economics and financial aspects of engineering projects

PLO-12: Life-long learning and Successful Career: an ability to recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change as well as ability to use the techniques and skills to face and succeed in competitive examinations like BCS, GRE, TOEFL etc.

Performance Criteria Definitions
Inspiring the students to further explore in his/her program to recognize the need for life-long Learning. Some aspects of life-long learning include:

- Understanding of the need for a high level of professional and ethical conduct in engineering
- Carry out research on computing topics by reading and reporting on papers in the technical literature.
- Involve oneself in professional activities (e.g. meeting, presentations, and workshops).
- Analyze and evaluate computing and engineering information and handle problems for which the required knowledge is not complete.

F-IV: Mapping between Program Educational Objectives (PEOs) and Program Outcome (POs)

PEOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
PEO-1	✓	✓	✓	✓	✓	-	-	-	-	-	-	-
PEO-2	✓	✓	✓	✓	✓	✓			✓	✓	✓	
PEO-3	✓	-	-	-	-	✓	✓	✓	✓	✓	✓	✓
PEO-4	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓

9. Attaining Complex Engineering Problem

The students can attain complex engineering problems in three different ways, such as:

a. Open-ended laboratory project
b. Complex engineering related assignment under any theory or laboratory course and
c. Capstone design project under the course of final year thesis/project (EEE-4860).

Thus, a student can attain at least one or more complex engineering problems through the process (a) and (b). In case any student fails to earn at least one complex engineering problem through the process (a) and (b), he must have to attain it through a capstone design project, as mentioned in process (c). Besides, industry visits for the students to be arranged regularly. The evaluation of the project/thesis is described below.

Marks distribution for projects/thesis is as follows:
1) Project/Thesis evaluation by Supervisor- 40%
2) Project/Thesis Report- 20%
3) Final Defense- 40%
Total 100%

10. Graduate Profile, Teaching Activities and Assessment

The Graduate Profile is a description of the personal qualities, skills, and attributes a student is expected to obtain by the end of an undergraduate degree program at the University. These are descriptions of attributes, or knowledge, skills, and attitudes, which a university intends its graduates will develop through their study to equip them for their future education or employment. These descriptions are written at the institution and program level and are used to inform curriculum design as well as guide the up-gradation of course outcomes, teaching activities, and assessment at courses. Graduate profiles are alternatively known as Program Outcomes (POs).

Program Outcomes assessment should consider the Knowledge Profile, the range of Complex Engineering Problem Solving and the range of Complex Engineering Activities. Mapping of Program Outcomes against Knowledge Profile, Complex Problem Solving, and Complex Activities is shown in Table 10.1

Table 10.1: Graduates Profiles as expected for the EEE program at IIUC as per BAETE.

*Engineering Graduates shall attain the following POs (Program Outcome) by the time of graduation as expected by BAETE (SA Report Manual 2017, BAETE)				
Program Outcome (POs) Graduate Profiles	Blooms Taxonomy Learning Domain	Knowledge Profile (K1-K8)	Complex Problems (P1-P7)	Complex Activities (A1-A5)
(a) Engineering Knowledge	Cognitive	K1-K4	A combin-ation of P1-P7	A combin-ation of A1 –A5
(b) Problem Analysis	Cognitive	K1-K4		
(c) Design/ Development of Solutions	Cognitive, Affective	K1-K8		
(d) Investigation	Cognitive, Psychomotor	K8		
(e) Modern Tool Usage	Psychomotor, Cognitive	K6		
(f) The Engineer and Society	Affective	K7		
(g) Environment and Sustainability	Affective, Cognitive,	K7		
(h) Ethics	Affective	K7		
(i) Individual and Teamwork	Psychomotor, Affective	A combin-ation of K1-K8		
(j) Communication	Psychomotor, Affective			
(k) Project Management and Finance	Cognitive, Psychomotor			
(l) Life-Long Learning	Psychomotor, Affective			

The engineering program of EEE that aims to develop the above-mentioned POs, which must ensure its curriculum encompasses all the attributes of the **Knowledge profile** (K1-K8) as presented in Table 10.2 and as included in the table 10.1. The range of Complex Problem solving (P1-P7) and Complex Engineering Activities (A1-A5) that should be addressed in the program are given in Table 10.3 and 10.4 respectively.

Table 10.2: Knowledge Profile

Knowledge Profile	Possible Course and topics
K1 A systematic, theory-based understanding of the natural sciences applicable to the discipline.	Physics, Chemistry, Biology, Geology. Biochemistry
K2 Conceptually based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modeling applicable to the discipline.	Calculus of variation, Ordinary and partial differential equations, Advanced mathematics, numerical analysis, Statistics, Relevant aspects of computer and information science.
K3 A systematic, theory-based formulation of	Engineering graphics, Mechanics, Electric and

engineering fundamentals required in the engineering discipline.	electronic circuits, Computing, Material Science, Thermodynamics and fluid mechanics.
K4 Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.	Electives such as Automatic control, Power plant, Robotics, System dynamics, Energy systems
K5 Knowledge that supports engineering design in a practice area.	Design processes, Innovative methods, Codes, Standards, Techniques such as Taguchi methods, TRIZ and House of Quality.
K6 Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.	Manufacturing, energy and Power production, Construction, Transportation, Communication
K7 Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability.	Ethics and professional responsibility of an engineer to public safety; the impact of engineering activity; Economic, social, cultural, environmental and sustainability.
K8 Engagement with selected knowledge in the research literature of the discipline.	Studying and summarizing selected published research papers in the discipline.

Table 10.3: Range of Complex Engineering Problem[1] Solving

Attribute	Complex Engineering Problem solving (its characteristic P1 and some or all of P2 to P7)
Depth of Knowledge required	**P1**: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K5, K6 or K8 which allows a fundamental-based, first- principles analytical approach
Range of conflicting requirements	**P2:** Involve wide-ranging or conflicting technical, engineering, financial and other issue.
Depth of analysis required	**P3**: Have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models.
Familiarity of issues	**P4:** Involve infrequently encountered issues
Extent of applicable codes	**P5:** Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement & level of conflicting requirements	**P6:** Involve diverse groups of stakeholders with widely varying needs.
Interdependence	**P7:** Are high-level problems that include many component parts or sub-problems. It will include teamwork between diverse groups of experts in solving this class of problems.
[1]Engineering problems that cannot be resolved without in-depth engineering knowledge and have some or all of the characteristics mentioned in Table 9.3.	

Table 10.4: Range of Complex Engineering Activities

Attribute	**Complex activities mean (engineering activities or projects that have some or all of the following characteristics:**
Range of resources	**A1**: Involve the use of diverse resources (for this purpose, resources include people, money, equipment, materials, information and technologies)
Level of interaction	**A2**: Require resolution of significant problems arising from interactions

	between wide ranging or conflicting technical, engineering or other issues
Innovation	**A3**: Involve creative use of engineering principles and research-based knowledge in novel ways.
Consequences to society and the environment	**A4:** Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation.
Familiarity	**A5:** Outside problems encompassed by standards and codes of practice for professional engineering.

Graduate profiles, known as Program Outcomes (POs), are mapped with both institutional missions and specific courses. Mapping Table F-V and Table F-VI are the basis for demonstrating the graduate profile.

Moreover, Table F-VI shows additional information that shows the teaching activities and assessment procedures of COs that collectively achieving the POs. The details of teaching activities and assessment procedures are to be found in the course file of individual course teachers.

Lastly, Table F-VI is a dummy template designed to provide guidance for academic staff and is intended to record and evaluate the achievement of constructive achievement of course outcomes, teaching activities, and assessment.

F-V: Mapping between Institutional mission and Program Outcome (POs)

Institutional Mission	PLO1	PLO2	PLO3	PLO4	PLO5	PLO 6	PLO7	PLO8	PLO9	PLO 10	PLO 11	PLO 12
IIUC MS-1	✓	✓	✓	✓	✓	✓	-	-	✓	✓	✓	-
IIUC MS-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IIUC MS-3	-	-	-	-	-	✓	✓	✓	✓	✓	✓	✓

F-VI: Course level Graduate profile shows mapping of POs with course outcomes, teaching activities* and assessment (A Template) *****

PLOs	**PLO1**			**PLO2**			**PLO3**			**PLO4**			**PLO5**			**PLO6**			**PLO7**			**PLO8**			**PLO9**			**PLO10**			**PLO11**			**PLO12**			**Unmapped COs if any**
Courses	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	Course Outcomes	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	**Course Outcomes**	Teaching Activities	Assessment	
EEE1101	1	2, 3	1, 5	2	1, 3	1, 4																														

EEE1201	1, 2	1, 3, 5	1, 2											2	1, 3	2, 3																		
...																																		

**** Values inserted here are not real. They are inserted to get an idea about the template.*

****Teaching Activities***	*****Assessment***
1. Lecture	1. Bloom's Taxonomy and Rubric based
2. White board writing	2. Class test
3. Question and Answer	3. Midterm examination
4. Power point presentation	4. Semester end (Final) examination
5. Analysis	5. Presentation
6. Feedback	6. Assignment
7. Example	7. Quiz
8. Problem Solving	8. VIVA
9. Homework	9. Lab Report
10. Group Work	10. Lab Performance
11. Group Discussion	11. Project work
More can be added by a teacher	

11. Admission Requirements

Admission at IIUC is purely on the basis of merit. Furthermore, admission to the available programs depends on the type and level of the program that a candidate wishes to pursue. Following are the general academic qualifications for admission in B.Sc. Engg. at IIUC.

i. For SSC/Dakhil, and HSC/Alim (Science Group) system the minimum shall be (SSC GPA) +(HSC GPA) = 6.50. (But score of less than GPA 3.0 in any individual examination is not acceptable). An applicant must submit his/her results during the application. Provisional admission for appeared students should not be allowed.

ii. For '0' level & 'A' level system an applicant must have completed 6 papers in '0' level and 6 papers in 'A' level, in the 'A' level the student must have completed at least 2 papers of Physics, 2 papers of Chemistry and 2 papers of Mathematics. Minimum average GPA of combined '0' level & 'A' level shall be 'C' an applicant must submit his results during the application. Provisional admission for appeared students should not be allowed. (iii) For applicants from foreign countries similar standard should be maintained. The applicant must have completed Physics, Chemistry and Mathematics in the 12th level.

12. Medium of Instruction

English is the primary languages used as the medium of instruction in the University.

13. Attendance

In order to be eligible to appear, as a regular candidate, at the semester final examinations, a student shall be required to have attended at least **70%** of the total number of periods of lectures/tutorials/laboratory classes offered during the semester in every **course.** A student whose attendance falls short of **70%** but not below **60%** in any **course** may be allowed to appear at the final examinations **as non-collegiate student**. A student, appearing the examination under the benefit of this provision shall have to pay in addition to the fees, the requisite fee prescribed by the authority for the purpose. Students having **less than 60% attendance** in lecture/tutorial/ laboratory of any course **will be declared dis-collegiate. They will not be allowed to appear in that course** at the final examinations of the semester. They will get 'F' grade in the semester result. The basis for awarding marks for attendance is as follows:

Attendance	Awarding marks
90% and above	10
85% to less than 90%	9
80% to less than 85%	8
75% to less than 80%	7
70% to less than 75%	6
65% to less than 70%	5
60% to less than 65%	4
less than 60%	0

14. The Grading System

The Grading System for assessing the performance of a course of a student shall be as follows:

Numerical grade Marks%	Letter Grade (LG)	Grade Point (GP/unit)	Remarks/Status
80-100	A+ (A plus)	4.00	Excellent
75 to less than 80	A (A regular)	3.75	Very good
70 to less than 75	A- (A minus)	3.50	
65 to less than 70	B+ (B plus)	3.25	Good
60 to less than 65	B (B regular)	3.00	
55 to less than 60	B- (B minus)	2.75	Satisfactory
50 to less than 55	C+ (C plus)	2.50	

45 to less than 50	C (C regular)	2.25	
40 to less than 45	D	2.00	Pass
00 to less than 40	F	0.00	Fail

The performance of a student will be evaluated in terms of semester **grade point average (GPA)** and **cumulative grade point average** (**CGPA**) which is the grade average for all semesters. To have graduation degree a student **must obtain CGPA at least 2.5.**

Grade Point Average (GPA): The Grade Point Average (GPA) is computed by dividing the total grade points earned by the number of credit hours attempted in a given semester. The Cumulative Grade Point Average CGPA) is computed by dividing the total grade points earned by the total number of credit hours attempted at the University up to a particular semester.

A Semester Grade Point Average (GPA) shall be calculated for each semester as follows:

$$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

where, n represents the number of courses offered during the semester, C_i represents the number of credits allotted to a particular course and G_i represents the grade point earned for that course.

The Cumulative Grade Point Average (CGPA) gives the cumulative performance of the students from the 1st Semester up to the end of the Semester to which it refers, and will be calculated as follows:

$$CGPA = \frac{\sum_{k=1}^{m} C_k G_k}{\sum_{k=1}^{m} C_k}$$

where, m represents the total number of semesters being considered, C_k represents the total number of credits registered during a semester and G_k represents the GPA of that particular Semester.

15. Earned Credit

The courses in which a student has obtained minimum 'D' in 'Theoretical courses', Laboratory courses & General Viva-voce' or higher grade will be counted as credits earned by the student. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credit. 'F' grade will not be counted for GPA calculation but will stay permanently on the Grade sheet and transcripts.

16. Category of Courses

The study program for the B. Sc. Engg. (EEE) shall carry a total of 162 credit hours. The c**ategory of courses is shown below.**

Category	**Credit Hours**		
	Theory	**Sessional**	**Total**
Language Courses	4	0	4
Social Science Courses	4	0	4
Humanities Courses	5	0	5
Non-Engineering Skills Courses	8	0	8

Mathematics	14	0	14
Basic Science Courses	9	3	12
Engineering Core Courses	6	3	9
EEE Core Courses	73	33	106
Total	**123**	**39**	**162**

17. Semester Workload

Minimum Workload for a regular semester is **12** credit hours or its equivalent and maximum load is up to 28 credit hours. Since IIUC is following the **Open Credit Hour System**, a student may register the expected number of credits with the recommendation of his/ her respective **academic advisor** and the approval of the Head of the Department or the Dean of the Faculty or the Pro-Vice Chancellor as the case may be. But the semester workload must be consistent with the range of GPA. Advisable semester workload for the Faculty of Science and Engineering under Open Credit Hour System (OCHS) based on GPA is given below **(**Ref. FSEO article 5.4**):**

RANGE of GPA	Maximum Load Allowed
3.75-4.00	28Cr.Hrs.
3.50-3.74	26Cr.Hrs.
2.75-3.49	24Cr.Hrs.
2.25-2.74	22Cr.Hrs.
2.00-2.24	20Cr.Hrs.
1.70-1.99	15Cr.Hrs.
Below 1.70 or Repeat Case (Due to very poor performance)	12Cr.Hrs

18. Rules for Promotion

18.1 Criteria for Semester Promotion

18.1.1 No semester fail status would exist under open credit hour system.

18.1.2 If any student earns '**D (Grade Point 2)**' or above grade for any course, the course should be credited.

18.1.3 The students must complete Pre-requisite Courses and previous incomplete or 'F' or 'W' grade courses before registration of advance courses.

18.1.4 Students who will not clear all prescribed courses of 1st& 2nd Semester within the 4th Semester he/she would not be allowed to get promoted/registered in the 5th Semester and students who will not clear all prescribed courses of 3rd& 4th Semester within the 6th Semester he/she would not be allowed to get promoted/registered in the 7th Semester. Student can go for internship in the 7th / 8th Semester.

18.2 Criteria for Failing in a Course

18.2.1 A student, who fails in a course within specific requirements of the Faculty and the curriculum of his/her program, may repeat the same course if the course is classified as "CORE" or "REQUIRED" course.

18.2.2 Or, the fail student may replace the course with another one if it is classified as "SUPPORTIVE" or "ELECTIVE" or "OPTIONAL" as determined by the department or the faculty as the case may be.

18.2.3 Notwithstanding any other provisions of these Regulations, a graduating student who obtains the minimum CGPA C+ (C plus, i.e. CGPA=2.5), but fails in any course, may be allowed to re-sit for that course subject to the examination rules and approval of the authority concerned.

18.3 Criteria for Improvement of Grade

18.3.1 The range of grade in that particular course should be "B-" (B minus).

18.3.2 That an application must be submitted to the Controller of Examination through the Head of the Department in order to repeat the course for the purpose of improvement at least two weeks prior to the deadline of registration and it has to be approved by the competent authority.

18.3.3 That the opportunity for improvement of grade shall be availed within two consecutive Semesters.

18.3.4 That payment shall be made in full amount for the course/s on credit hour basis.

18.4 Re-Evaluation of Examination Results

18.4.1 If the awarding grade is in order but the student wants his/her answer script to be reevaluated, then a prescribed Form (available at ACAD) shall have to be filled in and submitted by the student to the University Board of Appeals through the ACAD.

18.4.2 Per Course a fee (as determined by the University Board Examination) must be deposited along with the Form.

18.4.3 **An appeal may be made** on any or all of the following grounds:

18.4.3.1 If a student strongly believes that he/she deserves higher marks than he/she got in the course in question.

18.4.3.2 If a student reasonably believes that the evaluation has been conducted improperly or a portion of his/her marks has not been counted.

18.5 Adding and Dropping Courses

Students may add course/s to, or drop course/s from that they have already registered. To add and drop course/s, prescribed Add & Drop Form [available from the Controller of Examination (CoE) office] must be filled up and submitted to the respective Departmental office within first week of the current semester .These applications will be recommended by the academic advisor and approved by the Chairman of the Department . Departmental Head shall forward the Add/Drop applications to the concerned CoE office for necessary action. The total numbers of credit hours after add and drop exercise must be in adherence to the academic workload policy.

18.6 Withdrawal from Registered Courses

Students may apply for the withdrawal of courses that they have already registered for. The withdrawal exercise shall be done immediately after **Mid-Term** (i.e.9^{th} to 10^{th} week of the relevant Semester). The total number of credit hours after withdrawal must not fall below 12 credit hours, as specified above (article 16). A grade "W" is assigned to the courses that have been withdrawn. "W" is deleted from Final Transcript. Procedure of submission of application for Course-Withdrawal is same as 17.5.

18.7 Dropping Semester/Leave of Absence

A student may apply in a Prescribed Form (available at CoE) for Semester Drop or a leave of absence stating valid ground. The student must apply for Dropping the semester during the registration period. No fees will be imposed during such leave. A student who is suffering from a prolonged illness may request for a further period of leave of absence on medical ground by writing to CoE through Chairman of the Department. Drop duration will be calculated with the total duration of the Program ***i.e. for undergraduate program maximum 12 Semesters including drop period.***

If any student is found absent or unregistered without having permission for a whole semester, he/she has to bear the Semester fee for the respective Semester to continue his/her study. However, if any student is found absent or unregistered without permission, he/she will be considered as discontinued student. If such student wishes to continue the study, an appeal may be made to the authority through proper channel for re-admission.

19 Eligibility for Examination

19.1 No student shall be eligible to take part in any Semester Final Examination unless:

19.1.1 He/she is officially registered in such a course; and

19.1.2 He/she has fulfilled the required percentage of attendance and other requirements.

19.2 B**arring from examination**:

19.2.1 A student may be barred from taking examination if he/she fails to meet any of the above requirements (article 21.1) for eligibility to sit for an Examination. In such a case, the student may be given the chance to appeal for exoneration.

19.2.2 Unless otherwise recognized, any student debarred from any examination shall automatically receive a grade "Y" which is equivalent to an "F" for that course irrespective of course performance

19.2.3 In addition, the scholarship or financial assistance of students who are barred from the Semester Final Examination may be withdrawn or reduced by a certain amount as the University authority decides on case–by-case basis.

19.3 **Cheating in Examination**:

19.3.1 A student cheating in examination shall be deemed to have committed an offence and will be liable to disciplinary punishment.

19.3.2 Such punishment may be cancellation of the course in question, drop of the current semester, expulsion for an academic year or expulsion from the University, based on the weight and gravity of the offence.

19.3.3 Student receives the expulsion from the university for cheating in examination cannot be readmitted. In addition, the student will be deprived of any financial assistance in the following semester as the university authority decides on case by case basis.

20 Graduation Requirements

20.1 **Pre-Graduate Requirements:**

20.1.1 One Semester prior to graduation a student should submit a check list to Controller of Examination duly filled in.

20.1.2 Students intending for graduation should submit an application for graduation to Controller of Examination in the terminal semester in the University.

20.2 **Academic Requirements:**

20.2.1 Have passed all required and elective course as per program of curriculum.

20.2.2 Be an acceptable academic standing with a GPA of at least 2.50.

20.2.3 Be free from any negative report from the University authority in general and academic Discipline Committee in particular.

20.2.4 Have fulfilled co-curricular activities.

20.2.5 Have fulfilled other University requirements

20.3 **Transcripts:**

20.3.1 Results of each semester are normally distributed to every student at the beginning of the following semester. The result is for student's reference only and not to be used for any official purposes. The result produces report including the grades of all courses for that semester, the GPA and CGPA.

20.3.2 **Official Transcripts** is issued before graduation and upon written request of a student who has paid up all fees. Partial transcripts may also be issued in the same manner to existing students. However, a fee is charged for partial transcript (or testimonial.) of each semester.

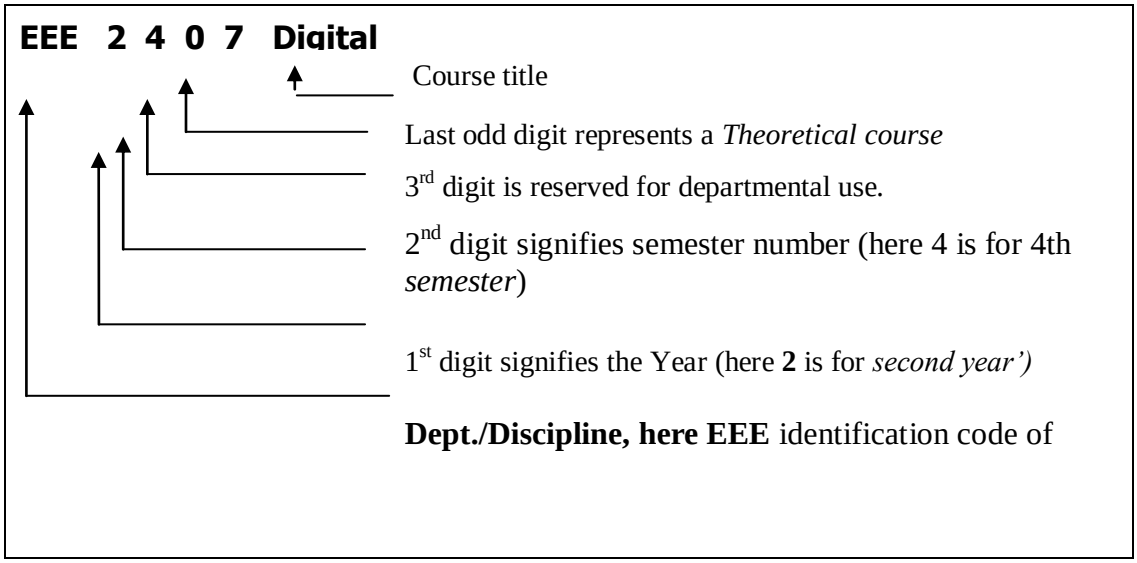
20.3.3 **Final Transcript and Provisional Certificat**e may be withdrawn on payment of fee. Besides, **Original certificate** may be issued on payment of fee only. Charges will be applied for the re-issue of duplicate certificate and transcript also.

20.4 **Release of Student's Record**:

Student's records are considered highly confidential. Therefore, a written consent from the student is needed before releasing information from his personal record to person outside the University. Information may be furnished to a student's parents or sponsor without such written consent. No information concerning a student's grades will be given over telephone.

21. **Course Identification Plan (Dept./Discipline)**

Following code plan has been adapted for course identification: First **digit** stands for Year, the **Second** digit stands for Semester, the **Third** digit is reserved for departmental use & the **Fourth** digit stands for the course number (odd number has been assigned to theory course and the even number has been assigned to seasonal course). An example of the above statement is as follows:



22 Descriptions of Courses

22.1 Summary of Courses of EEE department

Category	**Title of the Course**	**Credit Hours**		
		Theory	**Sessional**	**Total**
Arts & Humanities Courses	Advanced English	2	0	2
	Functional Bengali Language	2	0	2
	Sciences of Qur'an and Hadith	1	0	1
	*[1]Basic Principles of Islam	2	0	2
	*[2]A Survey of Islamic History and Culture	1	0	1
	*[3]Life and Teachings of the Prophet Muhammad (SAAS)	1	0	1
	Comparative Religion instead of *[123]	*4*	*0*	*4*
Total Arts & Humanities Courses		**9**	0	**9**
Social Sciences Courses	Text of Ethics and Morality	1	0	1
	Political Thoughts & Social Behavior	1	0	1
	Bangladesh Studies and History of the Independence	2	0	2
Total Social Science Courses		**4**	**0**	**4**
Non-Engineering Skills Courses	Financial and Managerial Accounting	2	0	2
	Principles of Economics	2	0	2
	Industrial Management	2	0	2
	Professional Ethics and Environmental Protection Law	2	0	2
Total Non-Engineering Skills Courses		**8**	**0**	**8**
Mathematic	Math (I+II+III+IV) and Statistics	14	0	14

s				
Basic Sciences Courses	Physics	6	1.5	7.5
	Chemistry	3	1.5	4.5
Total Mathematics & Basic Science Courses		**23**	**3**	**26**
Engineering Core Courses	Computer Programming	4	2	6
	Mechanical Engineering	2	0	2
	Engineering Drawing	0	1	1
Total Engineering Core Courses		**6**	**3**	**9**
EEE Core Courses	EEE compulsory	52	25.5	77.5
	EEE elective	21	7.5	28.5
Total EEE Core Courses		**73**	**33.0**	**106.0**
Total		**123**	**39**	**162**

22.2 Semester wise number of courses, credits & contact hours

Semester	No. of Courses	Contact Hours/Week			Credit Hours		
		Theory	Lab	Total	Theory	Lab	Total
1st	6+2	16	5	21	14	2.5	16.5
2nd	5+4	13	10	23	13	5	18
3rd	7+3	18	8	26	17	4	21
4th	7+3	19	9	28	19	4.5	23.5
5th	6+3	16	8	24	15	4	19
6th	6+4	16	10	26	15	5	20
7th	6+4	16	13	29	15	6.5	21.5
8th	6+4	15	15	30	15	7.5	22.5
Total	**49+27**	**129**	**78**	**207**	**123**	**39**	**162**

22.3 University Requirement Courses

Category	Course Code.	Course Title	Contact Hours/Week	Credit Hours
			Theory	Theory
Language Course	UREL-1106	Advanced English	3	2
	URBL-2401	Functional Bengali Language	2	2
Social Sciences	UREM-1101	Text of Ethics and Morality	2	1
	URED-3503	Introduction to Political Thoughts and Social Behavior	2	1
	URBS-4802	Bangladesh Studies and History of the Independence	2	2
Humanities	*[1]URED-1201	Basic Principles of Islam	2	2
	*[2]URED-2302	Sciences of Qur'an and Hadith	2	1
	*[3]URED-3604	Life and Teachings of the Prophet Muhammad (*SAAS*)	2	1
	URED-2305	*Comparative Religion instead of *[123]	3	3
	URIH-4701	A Survey of Islamic History and Culture	2	1

Category	Course Code.	Course Title	Contact Hours/Week	Credit Hours
			Theory	Theory
	Total		**19**	**13**

22.4 List of Non-Engineering Skills Courses

Category	Course Code	Course Title	Contact Hours/Week	Credit Hours
Non-Engineering Skills	ACC-2401	Financial and Managerial Accounting	2	2
	ECON-3501	Principles of Economics	2	2
	MGT-3601	Industrial Management	2	2
	XXX-47XX	to be taken from Interdisciplinary optional courses in section **17.9**	2	2
	Total		**8**	**8**

22.5 Mathematics Courses

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1	MATH-1107	Mathematics -I (Differential & Integral Calculus)	3	-	3	-	-
2	MATH-1207	Mathematics-II (Differential Equation & Coordinate Geometry)	3	-	3	-	MATH -1107
3	STAT-2303	Probability & Statistics	2	-	2	-	-
4	MATH-2309	Mathematics III (Linear Algebra, Matrices and Vector Analysis)	3	-	3	-	MATH-1207
5	MATH-2409	Mathematics IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform)	3	-	3	-	MATH-2309
	Total		**14**	**2**	**14**	**0**	**= 14 CH**

22.6 Basic Science Courses

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1	PHY-1101	Physics I	3	-	3	-	-
2	PHY-1201	Physics II	3	-	3	-	PHY-1101
3	PHY-1204	Physics Sessional	-	3	-	1.5	-
4	CHEM-2301	Chemistry	3	-	3	-	-
5	CHEM-2304	Chemistry Sessional	-	3	-	1.5	-
	Total		**9**	**6**	**9**	**3**	**= 12 CH**

22.7 Engineering Core Courses

Sl. No	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	

1.	CSE-1105	Computer Programming I	2		2		-
2.	CSE-1106	Computer Programming I Sessional		2		1	-
3.	CSE-1205	Computer Programming II	2	-	2	-	CSE-1105
4.	CSE-1206	Computer Programming II Sessional	-	2	-	1	-
5.	ME-2301	Fundamentals of Mechanical Engineering	2	-	2	-	-
6.	CE-1204	Engineering Drawing Sessional		2		1	
	Total		**6**	**6**	**6**	**3**	**= 9 CH**

22.8 EEE Core Courses

1.	EEE-1101	Electrical Circuits I	3	-	3	-	-
2.	EEE-1102	Electrical Circuits I Sessional		3	-	1.5	-
3.	EEE-1201	Electrical Circuits II	3	-	3	-	EEE-1101
4.	EEE-1202	Electrical Circuits II Sessional & Electrical Workshop		3		1.5	
5.	EEE-2301	Electronics I	3	-	3	-	EEE-1201
6.	EEE-2302	Electronics I Sessional	-	3		1.5	
7.	EEE-2303	Electrical Machine I	3	-	3	-	EEE-1201
8.	EEE-2306	Numerical Technique Sessional	-	2	-	1	
9.	EEE-2401	Electrical Machine II	3	-	3	-	EEE-2303
10.	EEE-2402	Electrical Machine Sessional	-	3	-	1.5	
11.	EEE-2407	Digital Electronics	3	-	3	-	EEE-2301
12.	EEE-2408	Digital Electronics Sessional	-	3		1.5	
13.	EEE-2411	Electronics II	3	-	3	-	EEE-2301
14.	EEE-2412	Electronics II Sessional and Electronics Workshop	-	3		1.5	
15.	EEE-2415	Transmission & Distribution of Electrical Power	3	-	3	-	EEE-1201
16.	EEE-3501	Continuous Signals and Linear Systems	3	-	3	-	MATH-2409
17.	EEE-3505	Microprocessor and Interfacing	3	-	3	-	EEE-2407
18.	EEE-3506	Microprocessor and Interfacing Sessional	-	3		1.5	
19.	EEE-3508	Circuit Simulation Sessional	-	2		1	EEE-2301

20.	EEE-3515	Electrical Properties of Materials	3	-	3	-	EEE-2301
21.	EEE-3519	Power System Analysis	3	-	3		EEE-2415
22.	EEE-3520	Power System Analysis Sessional	-	3		1.5	-
23.	EEE-3601	Communication Theory	3	-	3	-	EEE-3501
24.	EEE-3602	Communication Theory Sessional	-	3		1.5	
25.	EEE-3603	Digital Signal Processing I	3	-	3	-	EEE-3501
26.	EEE-3604	Digital Signal Processing I Sessional	-	3		1.5	-
27.	EEE-3607	Solid State Devices	3	-	3	-	EEE-3515
28.	EEE-3608	Research Methodology and Seminar		2		1	
29.	EEE-3612	Electrical Service Design Sessional	-	2	-	1	
30.	EEE-3621	Engineering Electromagnetism	3	-	3		EEE-1201
31.	EEE-4701	Control System I	3	-	3	-	EEE-3501
32.	EEE-4702	Control System I Sessional	-	3		1.5	
33.	EEE-4804	Industrial Attachment		2		1	
34.	EEE-4822	General viva-voce	1		1		
35.	EEE-4860	Project/Thesis	-	8	-	4	
	Total		**52**	**49**	52	**25.5**	**=77.5 CH**

22.9 Non-Engineering Skills Courses (one course to be taken)

Sl. No.	Course No.	Course Title	Contact Hours/Week	Credit Hours
1.	FIN-4701	Finance and Marketing for Engineers	2	2
2.	SCO-4703	Sociology	2	2
3.	PSY-4705	Psychology	2	2
4.	GOV-4709	Government	2	2
5.	LAW-4725	Professional Ethics and Environmental Protection Law	2	2

22.10 EEE Elective Courses

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1.	EEE-47xx	Major-I	3	-	3	-	
2.	EEE-47xx	Major -I Sessional	-	3	-	1.5	
3.	EEE-47xx	Major-II	3	-	3	-	

4.	EEE-47xx	Minor-I	3	-	3	-	
5.	EEE-47xx	Minor-I Sessional		3		1.5	
6.	EEE-48xx	Major-III	3	-	3	-	
7.	EEE-48xx	Major-III Sessional	-	3	-	1.5	
8.	EEE-48xx	Major-IV	3		3		
9.	EEE-48xx	Interdisciplinary-I	3	-	3		
10.	EEE-48xx	Interdisciplinary-I Sessional	-	3		1.5	
11.	EEE-48xx	Interdisciplinary -II	3	-	3		
12.	EEE-48xx	Interdisciplinary -II Sessional		3		1.5	
	Total	(7+5) Courses	21	15	21	7.5	=28.5 CH

22.11 Major in Electrical and Electronic Engineering

There are **three** majors in EEE. Students obtain the degree in EEE taking any one of the following majors (subject to the offering of major).

1. Major in Power Systems Engineering (PSE)
2. Major in Electronic Engineering (EE)
3. Major in Communication Engineering (CE)

In order to achieve a degree in Electrical and Electronic Engineering from IIUC, a student will have to complete 12 elective courses (5 lab courses and 7 theory courses) of 28.5 credit hours from the following five disciplines or specialized area:

i. Power systems Engineering
ii. Electronics Engineering
iii. Communication Engineering
iv. Interdisciplinary Field

A student has to take 2 lab courses and 4 theory courses from one group as major; 1 theory course and 1 lab course from other groups as minor and 2 theory courses and 2 lab courses from interdisciplinary group (total 12 courses i.e. 5 lab courses and 7 theory courses). Any lab course must be followed with the corresponding theory course and vice versa (if any).

22.12 Elective Courses

22.12.1 Power Systems Engineering

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1.	EEE-4705	Power Electronics	3	-	3	-	EEE-2411
	EEE-4706	Power Electronics Sessional	-	3	-	1.5	
2.	EEE-	Power Plant	3	-	3	-	-

	4707	Engineering					
3.	EEE-4801	Power System Protection	3	-	3	-	EEE-3519
	EEE-4802	Power System Protection Sessional	-	3	-	1.5	
4.	EEE-4805	Power System Operation & Control	3	-	3	-	EEE-3503
5.	EEE-4807	High Voltage Engineering	3	-	3	-	EEE-3503

22.12.2 Electronic Engineering

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1.	EEE-4753	VLSI I	3	-	3	-	EEE-3607
	EEE-4754	VLSI I Sessional		3		1.5	
2.	EEE-4713	Compound Semiconductor & Heterojunction Devices	3	-	3	-	
3.	EEE-4809	VLSI II	3	-	3	-	EEE-4753
	EEE-4810	VLSI II Sessional		3		1.5	
4.	EEE-4811	Opto-Electronics	3	-	3	-	EEE-2411
5.	EEE-4813	Semiconductor Device Theory	3	-	3		EEE-3607

22.12.3 Communication Engineering

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1.	EEE-4723	Microwave Engineering	3	-	3		EEE-3501
	EEE-4724	Microwave Engineering Sessional	-	3		1.5	
2.	EEE-4715	Digital Signal Processing II	3	-	3	-	EEE-3601
3.	EEE-4833	Digital Communication	3	-	3	-	EEE-3601
	EEE-4834	Digital Communication Sessional		3		1.5	
4.	EEE-	Mobile Cellular	3	-	3	-	EEE-

	4835	Communication					3601
5.	EEE-4837	Telecommunication Engineering	3	-	3	-	EEE-3601

22.12.4 Interdisciplinary Fields

SL. No.	Course Code	Course Title	Contact Hours/Week		Credit Hours		Prerequisite Courses
			Theory	Practical	Theory	Practical	
1.	EEE-4825	Biomedical Instrumentation	3	-	3	-	EEE-2411
	EEE-4826	Biomedical Instrumentation Sessional	-	3	-	1.5	
2.	EEE-4827	Measurement and Instrumentation	3	-	3	-	EEE-2411
	EEE-4828	Measurement and Instrumentation Sessional		3		1.5	
3.	EEE-4841	Antenna & Propagation	3	-	3	-	EEE-3601
	EEE-4842	Antenna & Propagation Sessional		3		1.5	
4.	EEE-4843	Renewable Energy System	3	-	3		
	EEE-4844	Renewable Energy System Sessional		3		1.5	
5.	EEE-4845	Embedded System	3		3		EEE-3505
	EEE-4846	Embedded System Sessional		3		1.5	
6.	EEE-4847	Optical Fiber Communication	3	-	3	-	EEE-3601
	EEE-4848	Optical Fiber Communication Sessional		3		1.5	

23 A. Semester wise Course Distribution:

I. FIRST SEMESTER: B.Sc. (Engg.) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-1101	Electrical Circuits I	**3**	**0**	**3**	**0**	**--**	**50**	**50**	**100**
2	EEE-1102	Electrical Circuits I Sessional	**-**	**3**	**-**	**1.5**	**-**	**50-60**	**40-50**	**100**
3	CSE-1105	Computer Programming I	**2**	**-**	**2**	**-**	**-**	**50**	**50**	**100**
4	CSE-1106	Computer Programming I Sessional		**2**		**1**	**-**	**50-60**	**40-50**	**100**
5	MATH-1107	Mathematics -I (Differential & Integral Calculus)	**3**	**-**	**3**	**-**	**-**	**50**	**50**	**100**
6	PHY-1101	Physics I	**3**	**-**	**3**	**-**	**-**	**50**	**50**	**100**
7	UREL-1106	Advanced English	**3**		**2**	**-**	**-**	**50**	**50**	**100**
8	UREM-1101	Text of Ethics and Morality	**2**	**-**	**1**	**-**	**-**	**50**	**50**	**100**
	Total	(6+2) Courses	**16**	**5**	**14**	**2.5**	Total= **16.5CH**			

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

II. SECOND SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-1201	Electrical Circuits II	**3**	**-**	**3**	**-**	EEE-1101	**50**	**50**	**100**
2	EEE-1202	Electrical Circuits II Sessional & Electrical Workshop	**-**	**3**	**-**	**1.5**	-	**50-60**	**40-50**	**100**
3	CSE-1205	Computer Programming II	**2**	**-**	**2**	**-**	CSE-1105	**50**	**50**	**100**
4	CSE-1206	Computer Programming II Sessional	**-**	**2**	**-**	**1**	-	**50-60**	**40-50**	**100**
5	PHY-1201	Physics II	**3**	**-**	**3**	**-**	PHY-1101	**50**	**50**	**100**
6	PHY-1204	Physics Sessional	-	**3**	-	**1.5**	-	**50-60**	**40-50**	**100**
7	MATH-1207	Mathematics-II (Differential Equation and Coordinate Geometry)	**3**	**-**	**3**	**-**	MATH-1107	**50**	**50**	**100**
8	CE-1204	Engineering Drawing Sessional	**-**	**2**	**-**	**1**	-	**50-60**	**40-50**	**100**
9	URED-1201	Basic Principles of Islam	2	-	2	-	-	**50**	**50**	**100**
	Total	(5+4) Courses	**13**	**10**	**13**	**5**	**Total=18CH**			

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

III. THIRD SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-2301	Electronics I	**3**	**-**	**3**	**-**	EEE-1201	**50**	**50**	**100**
2	EEE-2302	Electronics I Sessional	**-**	**3**	**-**	**1.5**		**50-60**	**40-50**	**100**
3	EEE-2303	Electrical Machine I	**3**	**-**	**3**	**-**	EEE-1201	**50**	**50**	**100**
4	EEE-2306	Numerical Technique Sessional	**-**	**2**	**-**	**1**		**50-60**	**40-50**	**100**
5	MATH-2309	Mathematics III (Linear Algebra, Matrices and Vector Analysis)	**3**	-			MATH-1207	**50**	**50**	**100**
6	STAT-2303	Probability & Statistics	**2**	**-**	**2**	**-**	-	**50**	**50**	**100**
7	ME-2301	Fundamentals of Mechanical Engineering	**2**	**-**	**2**	**-**	-	**50**	**50**	**100**
8	CHEM-2301	Chemistry	**3**	**-**	**3**	**-**	-	**50**	**50**	**100**
9	CHEM-2304	Chemistry Sessional	-	**3**	-	**1.5**	-	**50-60**	**40-50**	**100**
10	URED-2302	Sciences of Qur'an and Hadith	2	-	1	-	-			
11	Total	(7+3) Courses	**18**	**8**	**17**	**4**	Total = 21 CH			

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

IV. FOURTH SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-2401	Electrical Machine II	3	-	3	-	EEE-2303	**50**	**50**	**100**
2	EEE-2402	Electrical Machine Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
3	EEE-2407	Digital Electronics	3	-	3	-	EEE-2301	**50**	**50**	**100**
4	EEE-2408	Digital Electronics Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
5	EEE-2411	Electronics II	3	-	3		EEE-2301	**50**	**50**	**100**
6	EEE-2412	Electronics II Sessional and Electronics Workshop	-	3	-	1.5	-	**50-60**	**40-50**	**100**
7	EEE-2415	Transmission & Distribution of Electrical Power	3	-	3	-	EEE-1201	**50**	**50**	**100**
8	MATH-2409	Mathematics IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform)	3	-	3	-	MATH-2309	**50**	**50**	**100**
9	ACC-2401	Financial and Managerial Accounting	2	-	2	-	-	**50**	**50**	**100**
10	URBL-2401	Functional Bengali Language	2	-	2	-	EEE-2303			
11	Total	(7+3) Courses	**19**	**9**	**19**	**4.5**	Total 23.5CH			

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

V. FIFTH SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-3501	Continuous Signals and Linear Systems	3	-	3	-	MATH-2409	**50**	**50**	**100**
2	EEE-3505	Microprocessor and Interfacing	3	-	3	-	EEE-2407	**50**	**50**	**100**
3	EEE-3506	Microprocessor & Interfacing Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
4	EEE-3508	Circuit Simulation Sessional	-	2	-	1	EEE-2301	**50-60**	**40-50**	**100**
5	EEE-3515	Electrical Properties of Materials	3	-	3	-	EEE-2301	**50**	**50**	**100**
6	EEE-3519	Power System Analysis	3	-	3		EEE-2415	**50**	**50**	**100**
7	EEE-3520	Power System Analysis Sessional	-	3	-	1.5	EEE-2415	**50-60**	**40-50**	**100**
8	ECON-3501	Principles of Economics	2	-	2	-	-	**50**	**50**	**100**
9	URED-3503	Introduction to Political Thoughts and Social Behavior	2	-	1	-	-	**50**	**50**	**100**
	Total	(9+ 3) Courses	16	8	15	4	Total=**19CH**			

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

VI. SIXTH SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-3601	Communication Theory	3	-	3	-	EEE-3501	**50**	**50**	**100**
2	EEE-3602	Communication Theory Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
3	EEE-3603	Digital Signal Processing I	3	-	3	-	EEE-3501	**50**	**50**	**100**
4	EEE-	Digital Signal	-	3	-	1.	-	**50-60**	**40-50**	**100**

	3604	Processing I Sessional				5				
5	EEE-3607	Solid State Devices	3	-	3	-	-	**50**	**50**	**100**
6	EEE-3608	Research Methodology and Seminar	-	2	-	1		**50-60**	**40-50**	**100**
7	EEE-3612	Electrical Service Design Sessional	-	2	-	1	-	**50-60**	**40-50**	**100**
8	EEE-3621	Engineering Electromagnetism	3	-	3		MATH-3505	**50**	**50**	**100**
9	MGT-3601	Industrial Management	2	-	2	-	-	**50**	**50**	**100**
10	URED-3604	Life and Teachings of the Prophet Muhammad (saas)	2	-	1	-	-	**50**	**50**	**100**
	Total	(6+ 4) Courses	**16**	**10**	**15**	**5**	Total=**20CH**			

****Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

VII. SEVENTH SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-4860	Project/Thesis	-	4	-	2		**50-60**	**40-50**	**100**
2	EEE-4701	Control System I	3	-	3	-	EEE-3501	**50**	**50**	**100**
3	EEE-4702	Control System I Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
4	EEE-47xx	Major-I	3	-	3	-		**50**	**50**	**100**
5	EEE-47xx	Major-I Sessional	-	3	-	1.5		**50-60**	**40-50**	**100**
6	EEE-47xx	Major-II	3	-	3	-		**50**	**50**	**100**
7	EEE-47xx	Minor-I	3	-	3	-		**50**	**50**	**100**
8	EEE-47xx	Minor-I Sessional	-	3	-	1.5		**50-60**	**40-50**	**100**
9	URIH-4701	A Survey of Islamic History and Culture	2	-	1	-	-	**50**	**50**	**100**
10	LAW-	Professional	2	-	2	-		**50**	**50**	**100**

	4725	Ethics and Environmental Protection Law								
	Total	(6+4) Courses	**16**	**13**	**15**	**6.5**	**Total=21.5 CH**			

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

VIII. EIGHT SEMESTER: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-4860	Project / Thesis	-	4	-	2		**50-60**	**40-50**	**100**
2	EEE-4804	Industrial Attachment	-	2	-	1		**50-60**	**40-50**	**100**
3	EEE-48xx	Major-III	3	-	3	-		**50**	**50**	**100**
4	EEE-48xx	Major-III Sessional	-	3	-	1.5		**50-60**	**40-50**	**100**
5	EEE-48xx	Major-IV	3	-	3	-		**50**	**50**	**100**
6	EEE-48xx	Interdisciplinary-I	3	-	3	-		**50**	**50**	**100**
7	EEE-48xx	Interdisciplinary-I Sessional	-	3	-	1.5		**50-60**	**40-50**	**100**
8	EEE-48xx	Interdisciplinary -II	3	-	3	-		**50**	**50**	**100**
9	EEE-48xx	Interdisciplinary -II Sessional	-	3	-	1.5		**50-60**	**40-50**	**100**
10	EEE-4822	General viva-voce	1	-	1	-		**50**	**50**	**100**
11	URBS-4802	Bangladesh Studies and History of the Independence	2	-	2	-		**50**	**50**	**100**
	Total	(6+4) Courses	**15**	**15**	**15**	**7.5**	**Total=22.5CH**			

****Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

Grand Total = 162 CH

B. Semester wise Elective Courses

Major-I & Major-I Sessional: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Discipline	Prerequisite Courses	Marks		
			Th	Pr	Th	Pr			CIE	SEE	Total
1	EEE-4705	Power Electronics	3	-	3	-	PSE	EEE-2411	50	50	100
2	EEE-4706	Power Electronics Sessional	-	3	-	1.5	PSE	-	50-60	40-50	100
3	EEE-4723	Microwave Engineering	3	-	3		CE	EEE-3601	50	50	100
4	EEE-4724	Microwave Engineering Sessional	-	3	-	1.5	CE	-	50	50	100
5	EEE-4753	VLSI I	3	-	3	-	EE	EEE-3607	50	50	100
6	EEE-4754	VLSI I Sessional	-	3	-	1.5	EE	-	50	50	100

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

Major-II: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Discipline	Prerequisite Courses	Marks		
			Th	Pr	Th	Pr			CIE	SEE	Total
1	EEE-4707	Power Plant Engineering	3	-	3	-	PSE	EEE-2401	50	50	100
2	EEE-4713	Compound Semiconductor & Heterojunction Devices	3	-	3	-	EE	EEE-3607	50	50	100
3	EEE-4715	Digital Signal Processing II	3	-	3	-	CE	EEE-3603	50	50	100

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

Minor-III & Minor-III Sessional: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Discipline	Prerequisite Courses	Marks		
			Th	Pr	Th	Pr			CIE	SEE	Total
1	EEE-4801	Power System Protection	3	-	3	-	PSE	EEE-3519	50	50	100
2	EEE-4802	Power System Protection Sessional	-	3	-	1.5	PSE		50-60	40-50	100
3	EEE-4833	Digital Communication	3	-	3	-	CE	EEE-3601	50	50	100
4	EEE-4834	Digital Communication Sessional	-	3	-	1.5	CE		50-60	40-50	100
5	EEE-4809	VLSI II	3	-	3	-	EE	EEE-4753	50	50	100
6	EEE-4810	VLSI II Sessional	-	3	-	1.5	EE		50-60	40-50	100

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

Major-IV: B.Sc. (Engg) in EEE

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Discipline	Prerequisite Courses	Marks		
			Th	Pr	Th	Pr			CIE	SEE	Total
1	EEE-4807	High Voltage Engineering	3	-	3	-	PSE	EEE-3519	50	50	100
2	EEE-4837	Telecommunication Engineering	3	-	3	-	CE	EEE-3601	50	50	100
3	EEE-4811	Opto-Electronics	3	-	3	-	EE	EEE-2411	50	50	100

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

Interdisciplinary-I & Interdisciplinary-I Sessional

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-4827	Measurement and Instrumentation	3	-	3	-	EEE-2411	**50**	**50**	**100**
2	EEE-4828	Measurement and Instrumentation	-	3	-	1.5	-	**50-60**	**40-50**	**100**
3	EEE-4825	Biomedical Instrumentation	3	-	3	-	EEE-4701	**50**	**50**	**100**
4	EEE-4826	Biomedical Instrumentation Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
5	EEE-4841	Antenna & Propagation	3	-	3	-	EEE-	**50**	**50**	**100**
6	EEE-4842	Antenna & Propagation Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

Interdisciplinary-II & Interdisciplinary-II Sessional

SL. No	Course Code	Course Title	Contact Hours		Credit Hours		Prerequisite Courses	Marks		
			Th	Pr	Th	Pr		CIE	SEE	Total
1	EEE-4843	Renewable Energy System	3	-	3		-	**50**	**50**	**100**
2	EEE-4844	Renewable Energy System Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**
3	EEE-4845	Embedded System	3		3		EEE-3505	**50**	**50**	**100**
4	EEE-4846	Embedded System Sessional		3		1.5	-	**50-60**	**40-50**	**100**
5	EEE-	Optical Fiber	3	-	3	-	EEE-3601	**50**	**50**	**100**

	4847	Communication								
6	EEE-4848	Optical Fiber Communication Sessional	-	3	-	1.5	-	**50-60**	**40-50**	**100**

***Th=Theory, Pr=Practical, CIE=Continuous Internal Evaluation (Mid-term=30, Attendance=10 Quizzes/Class test=10) = 50; SEE= Semester End Exam= 50 marks**

24 Mapping between COs and POs

EEE graduates could be able to achieve the program outcomes after the completion of the courses for the bachelor's degree in EEE. Each of the courses has individual course outcomes (CLOs), described in the synopsis of the courses under section 25, for its specific course content to attain some of the PLOs. Hence, PLOs are served through the CLOs of all courses. The program outcomes of the program are assessed based on selected courses. For attaining program outcomes according to the selected course outcomes the benchmark is usually set by the academic committee of the department.

For each course of the program offered by the department, present a mapping of CLOs and PLOs, as per the following table. The mapping between the CLOs and the PLOs of all courses are shown in Table 24.1, 24.2, 24.3. In the table, '**1'** means there is a correlation between the CLOs and PLOs.

Table 24.1 Mapping between COs and POs of Non-Engineering Skill Courses

SL No	Course Code	ClOs	Program Learning Outcomes (PLOs)											
			PLO -1	PLO -2	PLO -3	PLO -4	PLO -5	PLO -6	PLO -7	PLO -8	PLO -9	PLO -10	PLO -11	PLO -12
1	ACC-2401	CLO -1											**1**	
		CLO -2											**1**	
		CLO -3											**1**	
		CLO -4											**1**	
2	ECON - 3501	CLO -1											**1**	
		CLO -2											**1**	
		CLO -3											**1**	
3	MGT-3601	CLO -1											**1**	
		CLO -2											**1**	
		CLO -3						**1**						
4	LAW-4725	CLO -1		1										
		CLO -2							1					
		CLO -3								1				
		CLO -4										1		
Total no of CLOs under each PLO			0	1	0	0	0	1	1	1	0	1	9	0

Table 24.2 Mapping between CLOs and PLOs of the Courses of Mathematic and Basic Sciences

SL No	Course Code	CLOs	Program Learning Outcomes											
			PLO -1	PLO -2	PLO -3	PLO -4	PLO -5	PLO -6	PLO -7	PLO -8	PLO -9	PLO -10	PLO -11	PLO -12
1	STAT-2311	CLO -1	1											
		CLO		1										

		-2												
		CLO -3	1											
		CLO -4				1								
2	MATH - 1107	CLO -1	1											
		CLO -2		1										
3	MATH - 1207	CLO -1	1											
		CLO -2		1										
4	MATH - 2309	CLO -1	1											
		CLO -2		1										
5	MATH - 2409	CLO -1	1											
		CLO -2		1										
6	PHY-1101	CLO -1	1											
		CLO -2		1										
7	PHY-1201	CLO -1		1										
		CLO -2			1									
8	PHY-1204	CLO -1	1											
		CLO -2		1										
		CLO -3				1								
9	CHEM -2301	CLO -1	1											
		CLO -2		1										
10	CHEM -2304	CLO -1		1										
		CLO -2				1								
		CLO -3										1		
Total no of CLOs under each PLO for this section			8	10	1	2	0	0	0	0	0	1	0	0

Table 24.3 Mapping between CLOs and PLOs of the Engineering Core Courses and EEE Core Courses

SL No	Course Code	CLOs	Program Outcomes											
			PLO -1	PLO -2	PLO -3	PLO -4	PLO -5	PLO -6	PLO -7	PLO -8	PLO -9	PLO -10	PLO -11	PLO -12

1	CSE-1105	CLO-1	1											
		CLO-2			1									
		CLO-3			1									
2	CSE-1106	CLO-1	1											
		CLO-2			1									
		CLO-3			1									
3	CSE-1205	CLO-1	1											
		CLO-2		1										
		CLO-3		1										
4	CSE-1206	CLO-1	1											
		CLO-2			1									
		CLO-3		**1**										
5	ME-2301	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
6	CE-1204	CLO-1	1											
		CLO-2			1									
		CLO-3		1										
		CLO-4				1								
7	EEE-1101	CLO-1	1											
		CLO-2		1										
8	EEE-1102	CLO-1	1											
		CLO-2		1										
		CLO-3										1		
9	EEE-1201	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
10	EEE-	CLO-	1											

		1												
	1202	CLO-2		1										
		CLO-3										1		
11	EEE-2301	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
12	EEE-2302	CLO-1	1											
		CLO-2		1										
		CLO-3										1		
13	EEE-2303	CLO-1	1											
		CLO-2		1										
		CLO-3	1											
14	EEE-2306	CLO-1	1											
		CO-2		1										
15	EEE-2401	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
16	EEE-2402	CLO-1	1											
		CLO-2				**1**								
		CLO-3										1		
17	EEE-2407	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
18	EEE-2408	CLO-1		1										
		CLO-2			1									
		CLO-3					1							
19	EEE-2411	CLO-1	1											

		CLO-2		1										
		CLO-3			1									
20	EEE-2412	CLO-1	1											
		CLO-2			1									
		CLO-3										1		
		CLO-4									**1**			
21	EEE-2415	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
22	EEE-3501	CLO-1	1											
		CLO-2		1										
23	EEE-3505	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
24	EEE-3506	CLO-1		1										
		CLO-2			1									
		CLO-3					1							
		CLO-4										1		
25	EEE-3508	CLO-1	1											
		CLO-2					**1**							
		CLO-3			1									
26	EEE-3515	CLO-1	1											
		CLO-2	1											
		CLO-3												
27	EEE-3519	CLO-1	1											
		CLO-2	1											
		CLO-3		1										

28	EEE-3520	CLO-1	1											
		CLO-2			1									
		CLO-3										1		
29	EEE-3601	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
30	EEE-3602	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
31	EEE-3603	CLO-1	1											
		CLO-2				1								
		CLO-3			1									
32	EEE-3604	CLO-1	1											
		CLO-2			1									
		CLO-3					1							
		CLO-4								1				
33	EEE-3607	CLO-1	1											
		CLO-2			1									
		CLO-3				1								
34	EEE-3608	CLO-1												1
		CLO-2										1		
		CLO-3								1				
35	EEE-3612	CLO-2			**1**									
		CLO-3					1							
		CLO-4									1			
		CLO-5												1
36	EEE-3621	CLO-1	1											
		CLO-	1											

		2												
		CLO-3		1										
37	EEE-4701	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
38	EEE-4702	CLO-1	1											
		CLO-2					1							
		CLO-3			1									
39	EEE-4804	CLO-1	1											
		CLO-2					1							
		CLO-3									1			
		CLO-4										1		
		CLO-5												1
40	EEE-4860	CLO-1	1											
		CLO-2												1
		CLO-3										1		
		CLO-4									1			
		CLO-5								**1**				
		CLO-6				**1**								
41	EEE-4822	CLO-1	1											
		CLO-2										1		
		CLO-3												1
42	EEE-4705	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
43	EEE-4706	CLO-1	1											
		CLO-2			1									
		CLO-3										1		

44	EEE-4707	CLO-1	1											
		CLO-2							**1**					
		CLO-3		1										
45	EEE-4801	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
46	EEE-4802	CLO-1	1											
		CLO-2						**1**						
		CO-3			1									
47	EEE-4807	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
48	EEE-4753	CLO-1	1											
		CLO-2		1										
		CLO-3			1									
49	EEE-4754	CLO-1	1											
		CLO-2					1							
		CLO-3										1		
50	EEE-4827	CLO-1	1											
		CLO-2			1									
		CLO-3		1										
51	EEE-4828	CLO-1					1							
		CLO-2			**1**									
		CLO-3						**1**						
52	EEE-4843	CLO-1							**1**					
		CLO-2						**1**						
		CLO-3			1									
53	EEE-4844	CLO-1	1											

		CLO-2			1								
		CLO-3					1						
Total no of CLOs Under each PLO for this Section			51	32	38	**4**	10	3	2	3	4	13	1	5

The Table-24.4 and Fig. 24.1, shows the summary of CLOs to PLOs mapping from all the courses to depict how the EEE department is providing PLOs to the graduates by the well-structured courses to meet the demand of the fast-developing society.

Table 24.4 Summary of the mapping between COs and POs that the number of COs from all of the courses that map with the PO

Program Outcomes												
PLOs-→	**PLO-1**	**PLO-2**	**PLO-3**	**PLO-4**	**PLO-5**	**PLO-6**	**PLO-7**	**PLO-8**	**PLO-9**	**PLO-10**	**PLO-11**	**PLO-12**
The summation of CLOs from the tables 24.1,24,2 and 24.3	**59**	**43**	**39**	**6**	**10**	**4**	**3**	**4**	**4**	**15**	**10**	**5**

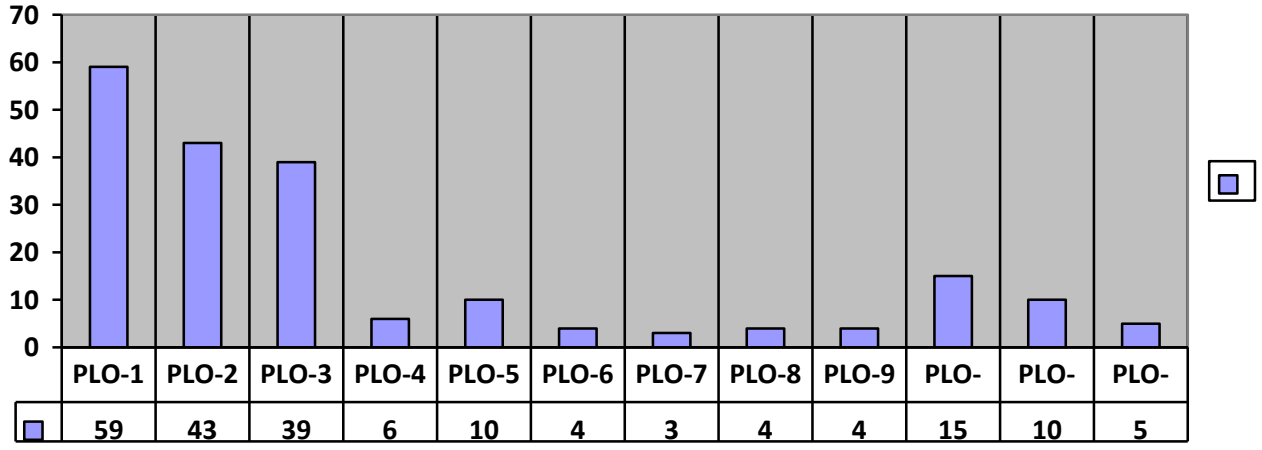


Fig. 24.1: Individual PLO map with the total number of CLOs of all courses

25. Template of the synopsis

A. Template of the synopsis of a theoretical course

Course Code: Course Title:
Credit Hours: Contact Hours:

1:

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives

2:

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-X_1		PLO-Y_1	
CLO-X_2		PLO-Y_2	
CLO-X_N		PLOY_N	

3: CLO-

Section-A (Mid-term: 30 Marks)

1. First Segment.
2. Second Segment
3. Third Segment

Section-B (SEE: 50 Marks)
Group-A (20 Marks)

4. Fourth Segment
5. Fifth Segment

Group-B (30 Marks)

6. Sixth Segment
7. Seventh Segment
8. Eight Segment

4: Course

Reference Books

5:

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode				

	must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

B. Template of the synopsis of a sessional course

Course Code: Course Title:
Contact Hours: Credit Hours:

1: Intro

Objectives

2:

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-X_1		PLO-Y_1	
CLO-X_2		PLO-Y_2	
CLO-X_N		PLOY_N	

3: CLO-

List of the Experiment is shown in laboratory manual of the department.

Reference Books:

4:

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

26. Synopsis of the Courses

A. Mathematics Courses

Course Code: MATH-1107 **Course Title: Mathematics I (Differential and Integral Calculus)**
Credit Hours: 3 **Contact ours: 3 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: The objective of this course is to provide the students with an understanding of how to find out the rate of change of various functions, and to determine the area and volume of different types of objects. This course aims to introduce the student with the various techniques of differentiation and integration.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	For complex Engineering problems, it is essential to get Knowledge of the limit, continuity, and differentiability, power series, Rolle's Theorem, Mean value theorem, Taylor, and McLaurin series. Also, the need concept of the partial derivative and Integration.	PLO-1	Cognitive/ Understanding
CLO-2	By using the above mentioned foundational mathematical information; One can implement it to solve the mathematical problems, which is expressing engineering principles.	PLO-2	Cognitive/Applying

Section-A (Mid-term: 30 Marks)

1. **Functions**, Limit, Continuity and Differentiability, Physical meaning of derivative of a function, Indeterminate Forms.
2. **Differentiation**, Successive differentiation and Leibniz theorem
3. **General Theorems** and Expansions: Rolle's Theorem, Mean Value Theorem, Taylor's Theorem and McLaurin's Theorem.

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **Partial Differentiation**, Euler's formula, Maxima and minima
5. **Indefinite integral**: Physical meaning of integration of a function, method of Substitution, Integration by parts, special trigonometric functions and rational and partial fractions, different techniques of integration.

Group-B (30 Marks)

6. **Definite integral**: Fundamental theorem, general properties, and evaluations of definite integral and reduction formula, definite integral as the limit of a sum, Integration by method of successive reduction, Gamma and Beta Function.
7. **Multiple Integral**: Jacobian theorem, Double Integral, Change of order of integration, triple Integral, Physical Application of double and triple integral. Quadrature, Determination of length of curves, Finding Area of a region,
8. **Integration by Revolution**: Areas of surfaces of revolution, Volumes of solids of revolution. Solving Real world problems through calculus.

Recommended Reference:

1. George B. Thomas Jr., Ross L. Finney, ***Calculus and Analytic Geometry***, 12th ed., USA, Pearson Education, 27 September 2019
2. Howard Anton, ***Calculus A New Horizon***, 6th ed, USA, Wiley,1 November 1997
3. B.C. Das, B.N. Mukherjee, ***Differential Calculus***, 54th ed, India, U.N. Dhur & Sons Private Ltd, July 2008
4. B.C. Das, B.N. Mukherjee, ***Integral Calculus***, 54th ed, India, U.N. Dhur & Sons Private Ltd, July 2008
5. Michael D. Greenberg, ***Advanced Engineering Mathematics***, 2nd ed., Dorling Kindersley Pvt Ltd, December 1, 2006
6. Prof Glyn James, David Burley & Dick Clements, ***Advanced Modern Engineering Mathematics***, 7th ed., Pearson Education, 30 July 2018

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: MATH-1207 **Course Title: Mathematics-II (Geometry & Differential Equations)**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: MATH-1107]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: Geometry deals with space and shapes. The objective of this course is to develop an understanding of the visual ability, to enable the students to make the design of solving problems, and to improve the skills of reasoning. Through this course student will learn how to solve different types of differential equations.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Demonstrate the basic idea of vector spaces, subspaces, Linear dependence and independence of vectors, Linear mappings, Inner product spaces and be able to find the eigenvalues and eigenvectors of a square matrix using the characteristic polynomial and will know how to diagonalize a matrix. Applying these to solve the linear algebra in electric network.	PLO-1	Cognitive/ Understanding
CLO-2	Get the basic understanding about scalar and vectors, dot Product, cross product derivative of vectors, vector integration. Analyze complex engineering problems be able to know gradient, divergence, curl and their physical significance and to learn the Greens, Gauss & Stocks theorem and their applications and be familiar with vector components in spherical and cylindrical systems.	PLO-2	Cognitive/ Understanding

Section-A (Mid-term: 30 Marks)

1. **Two-Dimensional Geometry**: Change of Axes**,** Pair of straight lines. General equation of second degree presents a pair of straight lines, Properties of Pair of straight lines, System of circles.
2. **Three-dimensional Geometry**: Rectangular co-ordinate System, Direction cosines, Direction ratios, Projections, Equation of planes, Different forms of planes.
3. **Straight lines in three-dimension**, Angle between two lines, Angle between a lines and a plane, coplanar lines and Shortest distance, Spheres.

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **First order differential equation:** Definition, solution of first order and first-degree differential equation with initial conditions, Solution of Linear Differential Equation, Separable Equations, homogeneous equations, Bernoulli Equation, Exact Differential equations, Integrating Factors, Boundary Value Problems.
5. **Higher order Differential equations with constant coefficients**: Solution of higher order homogeneous differential equations, Solution of non-homogeneous differential equations, Auxiliary Equations, Complementary function and particular integral

Group-B (30 Marks)

6. **Bessel's functions**, Legendre's polynomials and their properties, Linear differential Equation of second-degree using Method of variation of parameter & Method of Undetermined coefficients.
7. **Linear & Non-Linear Partial Differential Equations:** Elimination of arbitrary constants and functions, Lagrange's method, Charpit's method. Solving linear partial differential equations with constant coefficients, Complementary function and particular integrals, Short method.
8. **Physical Applications:** Solution of Practical (Real world) problems using differential equations such as Growth and Decay Problems, Temperature Problems, Falling Body Problems, Dilution Problems,

Electrical Circuits problems, Orthogonal Trajectories, Spring Problems, Buoyancy Problems, Classifying Solutions etc.

Recommended Reference:

1. JT bell, ***Coordinate Geometry***, 6th ed, Macmillan,12 October 2018
2. M.L. Khanna, ***Solid Geometry***, 19th ed, Jai Prakash Nath & CO, 2003
3. Stroud K., ***Further Engineering Mathematics: Programs and Problems***, 4th ed., Industrial Press Inc. New York, 1992
4. H.K. Dass, ***Advanced Engineering Mathematics***, 8th ed., S Chand, 1 December 2007.
5. Frank Ayres, ***Theory and Problems of Differential Equations***, 4th ed, McGraw-Hill Education, 9 December 2011
6. Michael D. Greenberg, ***Advanced Engineering Mathematics***, 2nd ed., Dorling Kindersley Pvt Ltd, December 1, 2006

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code : MATH-2309

Course Title : Mathematics III (Linear Algebra, Matrices and Vector Analysis)

Credit Hours: 3

Contact Hours: 3 per Week

[Prerequisite: MATH-1207]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Mathematics' in regard to vector spaces and subspaces, basis and dimension and linear mappings, inner product spaces, matrix and linear system of

equations, characteristic equation and diagonalization, vector analysis, del operator, vector integration and vector's theorem.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Demonstrate the basic idea of vector spaces, subspaces, Linear dependence and independence of vectors, Linear mappings, Inner product spaces and be able to find the eigenvalues and eigenvectors of a square matrix using the characteristic polynomial and will know how to diagonalize a matrix. Applying these to solve the linear algebra in electric network.	PLO-1	Cognitive/ Applying &Analyzing
CLO-2	Get the basic understanding about scalar and vectors, dot Product, cross product derivative of vectors, vector integration. Analyze complex engineering problems be able to know gradient, divergence, curl and their physical significance and to learn the Greens, Gauss & Stocks theorem and their applications and be familiar with vector components in spherical and cylindrical systems.	PLO-2	Cognitive/ Applying

Section-A

(Mid-term Exam: 30 Marks)

1. **Vector Spaces and Subspaces:** Definition of vector spaces, subspaces, basic theorem, Linear combinations of vectors, spanning set, Linear dependence and independence of vectors.
2. **Basis and Dimension and Linear Mappings:** Basis and Dimensions of Vector spaces, Sums and Direct sums of subspaces. Mappings, Linear mappings, Kernel and image of a linear mapping, Singular and non-singular mappings, Linear mapping and systems of linear equations.
3. **Inner Product Spaces:** Inner product spaces, Cauchy-Schwarz inequality, Orthonormal sets, Gram-Schmidt orthogonalization process, Application of Linear algebra in electric network.

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **Matrix and Linear System of Equations:** Vector presentation by matrix, different types of matrices, algebraic operations on matrices, adjoint and inverse of a matrix, augmented matrix, row operation method, rank of Matrices, some problems, Normal Vector, Ortho normal Vectors, Orthogonality, Echelon form, consistency and inconsistency, solution of homogeneous and non- homogeneous linear system of equations.
5. **Characteristic equation and Diagonalization:** Eigen values and eigenvectors, characteristic polynomial, Caley-Hamilton theorem, Diagonalization of matrices and symmetric matrices, Characteristics roots.

Group-B (30 Marks)

6. **Vector analysis:** Scalar and vectors, operation of vectors, vector addition and multiplication - their applications, Scalar Field, Vector Field, Dot Product, Cross product, Triple Product, Derivative of vectors and problems.
7. **Del operator and Vector Integration:** Del operator, gradient, divergence and curl and their physical significance, Line Integrals, physical significance of Vector integration and Problems.
8. **Vector's Theorem:** Greens, Gauss & Stocks theorem and their applications, Vector components in spherical and cylindrical systems.

Recommended Reference:

1. Seymour Lipschutz & Marc Lipson, ***Schaum's Outlines of Linear Algebra***, 5th ed.,

McGraw-Hill Education, 2012.
2. Richard Bronson, ***Linear Algebra: An Introduction,*** 4th ed., Academic Press, 1995.
3. Murray Spiegel, Seymour Lipschutz & Dennis Spellman, ***Vector Analysis,*** 2nd ed., McGraw-Hill Education, May 4, 2009.
4. P.N.Chatterjee, ***Matrices***, 5th ed., Anu Books, 1 January 2019.
5. Jr. Frank Ayres, ***Theory and Problems of Matrices: Including 340 Solved Problems, Completely Solved in Detail (Schaum's Outline Series)***, 1st ed., Schaum's Outline, June 1, 1967

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: MATH-2409 **Course Title: Mathematics IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform)**

Credit Hours: 3 **Contact Hours: 3 per Week**

[Prerequisite: MATH-2309]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Mathematics' in regards to complex variable, complex transformations, complex integration, residue and contour integration, Laplace transforms, convolution, Fourier series and transform**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Strengthen the understanding of complex Variables, Fourier Series, and then the idea of function transformation by the help of Laplace, Fourier, and Z-	PLO-1	Cognitive / understanding

	transformation method to solve complex engineering problem.		
CLO -2	The advancement of the knowledge of Complex variables, Convolution integral, Laplace, Fourier Series, and Z-transformation methods, are implemented in various complex engineering problem interpretation and applicability by using the mathematical formulations.	PLO-2	Cognitive/ Applying

Section-A

(Mid-term Exam: 30 Marks)

1. **Complex variable:** Complex numbers and their properties, functions of a complex variable, DeMoivre's Theorem and its applications**,** Limit, Continuity and differentiability, Differentiation of a complex function, Analytic function, Necessary and sufficient condition to analytic, Cauchy-Riemann Equation.
2. **Complex Transformations:** Orthogonal curves, Harmonic functions, Method of finding conjugate functions, Milne Thomson method, Transformations, Conformal transformations, Bilinear transformations.
3. **Complex Integration:** Complex Integration, Cauchy's integral theorem, Cauchy integral formula, Liouville's theorem, Taylor's theorem.

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **Residue and Contour Integration:** Singular point, Residue, Method of finding residue, Residue theorem, Contour integration.
5. **Laplace transforms**: Definition, Laplace transforms of different functions, inverse Laplace transforms, shifting and change of scale property, Laplace transforms of derivatives.

Group-B (30 Marks)

6. **Convolution:** Unit Step Function, Impulse Function, Periodic functions, Ramp Function, Sketch Waveform, convolution theorem.
7. **Fourier series**: Fourier series, Trigonometric form and Complex form of Fourier series and Fourier Integral, Physical Application of Fourier Series.
8. **Transform:** Fourier transforms, Z transforms.

Recommended Reference:

1. Prof Glyn James, David Burley & Dick Clements, ***Advanced Modern Engineering Mathematics***, 7th ed., Pearson Education, 30 July 2018.
2. Michael D. Greenberg, ***Advanced Engineering Mathematics,*** 2nd ed., Dorling Kindersley Pvt Ltd, December 1, 2006.
3. Stroud K., ***Further Engineering Mathematics: Programs and Problems,***4th ed., Industrial Press Inc. New York, 1992.
4. H.K Dass, ***Advanced Engineering Mathematics***, 8th ed., S Chand, 1 December 2007.
5. M.R. Spiegel, ***Complex Variables*** 4th ed., Schaum's Outline, January 1, 1980
6. Murray R. Spiegel, ***Schaum's Outline Series: Theory and Problems of Laplace Transforms***, 4th ed., Schaum's Outline, January 1, 1965.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10

Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: STAT-2311 **Course Title:** Probability and Statistics

Contact Hours: 2 lecture hours per week **Type: Core, B.SC Engineering**

Prerequisite: STAT-1201(Statistics)

Course Assessments	**CIE**: Continuous Internal Evaluation	Attendance	10 Marks
		Class test/ Assignment/ Quizzes	10 Marks
		Mid-term	30Marks
	SEE: Semester End Examination		50 Marks

1. Course Rationale / Summary:

This course is to provide an understanding for the engineering student on statistical concepts to include measurements of location and dispersion, probability, probability distributions, hypothesis testing, regression, and correlation analysis.

2. Course Objective:

a. Demonstrate understanding of descriptive statistics by practical application of quantitative reasoning and to the solution of engineering problems withdata visualization.
b. Be able to compute and interpret the results of correlation and regression.
c. Probability and its distributions to various engineering problems.
d. Perform hypothesis testing using statistical methods and estimation.

3. Mapping of CLO to PLO:

#	Description of Course Learning Outcome (CLO): Upon successful completion of this course, students will be able to:	PLOs	Bloom's Taxonomy Domain/Level
CLO1	Demonstrate understanding of descriptive statistics by practical application of quantitative reasoning and to the solution of engineering problems with data visualization.	PLO1	Cognitive/ understanding
CLO2	Will Be able to compute and interpret the results of correlation and regression.	PLO2	Cognitive/ Evaluating
CLO3	Demonstrate probability and its related distributions to the solution of engineering problems.	PLO1	Cognitive/ Applying
CLO4	Create hypothesis for data analysis	PLO4	Cognitive/Creating

4. Course Content:

Chapter	Section-A (Midterm Exam: 30 Marks)	Lecture	CLO
1	**Preliminary idea of Statistics:** Origin, History and Development Statistics, Definition of Statistics, Characteristics, Function, Limitations, Necessity & importance of Statistics, The role of Statistics in Engineering, Population and Sample, Variable and Constants, Different types of variables, Parameter, Statistic, Scale of measurement, Statistical data, collecting engineering data, Preparation of Questionnaire and Schedule, Presentation and Classification of Data, Construction of Frequency distribution, Graphical presentation of Frequency distribution.	5	**CLO1**
2	**Measures of Central Tendency:** Different types of mean with their properties and relationship, Quintiles with their graphical presentation, Application of different measures of central tendency.	3	**CLO1**
3	**. Measures of Dispersion of a Series of Data:** Range, Standard Deviation, Mean Deviation, Quartile Deviation, Variance and Standard Deviation, Coefficient of Variation and their uses, Properties and applications of different measures of dispersion, moments, skewness and kurtosis.	4	**CLO1**
	Section-B (Final Exam: 50 Marks) **Group-A (20 Marks)**		
4	**Correlation Theory and Regression Analysis:** Simple Correlation and its measure, Scatter Diagram, properties of simple correlation coefficient, Spearman's Rank correlation coefficient, Simple linear regression, properties of regression coefficient, regression curve, regression equation, Least-square method of curve fittings, Co-efficient of determination, Theorems & Problems.	4	**CLO2**
5	**Basic concepts of probability:** History, meaning and Scope of probability, Approaches of defining probability: Classical, Empirical, Subjective and Axiomatic probability, Experiment, random experiment, Sample Space, Event, different types of events, Tree diagram, Conditional probability and independence, some elementary theorems on probability, and conditional probability, Laws of Probability – Additive and Multiplicative Law, Prior probability, Posterior probability, total probabilities & Bayes' theorem and their applications.	4	**CLO3**
	Group-B (30 Marks		
6	**Random Variables and Mathematical Expectation:** Discrete and continuous random variables, Probability mass function and density function, Distribution function and their properties, Mathematical expectation and variance of a random variables. Theorems & Problems	3	**CLO1** **CLO3**
7	**Probability Distributions:** Binomial distribution, Poisson	4	**CLO1**

	distribution and Normal distribution – Their properties, uses, Theorems & Problems		**CLO3**
8	**Test of hypothesis and Estimation:** Preliminary ideas of statistical hypothesis test, level of significance, one tailed and two tailed test, p-value, Test of significance, Test regarding single mean, test of equality of two mean, test of equality of several means (Analysis of variance), test regarding proportion. General concepts of Estimation.	3	**CLO4**

5. Resources:

Text Books

1. Montgomery Douglas C & Runger George C, "*Applied Statistics and Probability for Engineers",* John Wiley and Sons, Inc. Fifth Edition, (2011). ISBN: 978-0-470-05304-1
2. Walpole R.E, Myers R.H, Myers S.L, & Ye K.Y, *"Probability and Statistics for Engineers and Scientist",* Prentice Hall, 9th ed. (2012). ISBN 978-0-321-62911-1
3. R.N. Shill & S.C. Debnath, "*An introduction to the theory of Statistics*", STAR Publication, 4th Edition (2016).

Reference Books

1. L-Garcia, A. "Probability, Statistics and Random Processes for Electrical Engineering" , 1st Cambridge University Press, Third Edition (2014). ISBN-13: 978-0131471221
2. Keshava & Reddy E. "Probability and Statistics". Pearson Education India, 5th Edition (2015). ISBN: 9789332558229

Online Resources:https://www.khanacademy.org/math/statistics-probability

6. Course Assessment Pattern (Theory courses):

Bloom's Category		**Evaluations out of 100 marks**			
		CIE (50 marks)			**SEE (50marks)**
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective				

	(Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

A. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation,

B. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term & SEE. Project evaluation & Viva

B. Basic Science Courses

Course Code: PHY-1101 **Course Title: Physics I (Mechanics, Waves and Thermodynamics)**
Credit Hours: 3 **Contact Hours: 3 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Physics' in regard to the dynamics of rigid body, gravity and gravitation, elasticity, surface tension, fluid dynamics and viscosity, waves and oscillations, thermodynamics and optics.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Understand some fundamental laws and theorem of physics.	PLO-1	Cognitive/Understand
CLO-2	Apply mathematical knowledge to formulate and solve engineering problems.	PLO-2	Cognitive/Apply

Section –A (Mid-term Exam: 30 Marks)

1. **Dynamics of Rigid Body:** Linear motion of a body as function of time, position and velocity, momentum, conservation theorem of momentum and energy, collision and torque, center of mass of rigid body, rotational kinetic energy, fly wheel, axes theorems and their applications.
2. **Gravity and Gravitation:** Definitions, compound pendulum, gravitational potentials and fields and relation between them, potential due to spherical shell, escape velocity and Kepler's law of planetary motion.
3. **Elasticity:** Hooke's law, relation between different elastic constants, bending of beams, cantilever, determination of Young's modulus and its engineering applications.

Section- B (SEE: 50 Marks)
Group- A (20-Marks)

4. **Surface Tension:** Definitions, cohesion, adhesion and molecular range, molecular theory of surface tension, capillarity, angle of contact, expression for surface tension, relation between surface energy and surface tension.
5. **Fluid Dynamics and Viscosity:** Streamline and turbulent motion, equation of continuity, energy of a liquid in motion, Bernoulli's theorem, viscosity, coefficient of viscosity, Stoke's law.

Group-B (30 Marks)

6. **Waves and Oscillations:** Waves in elastic media, standing waves, Sound waves, beats and Doppler's effect in sound, simple harmonic motions, total energy and average energy, damped and forced vibration, resonance.

7. **Thermodynamics:** Thermodynamic system, first and second law of thermodynamics and their applications, the thermodynamic temperature scale, Carnot's heat engine, the efficiency of engine, combined first and second law of thermodynamics, entropy and refrigerator.
8. **Optics:** Theories of light, interference of light, Young's double slit experiment, Fresnel and Fraunhoffer diffraction, diffraction of single slit, polarization of light, Production and analysis of polarized light, Brewster's law, Malu's law.

Recommended Reference:

1. R. Resnick and D. Halliday, K. S. Krane, ***Physics (Volume I)***, *5th edition*, New Delhi: Wiley Eastern Private Ltd., 2014, p. 546.
2. Brij Lal & Subrahmanyam, ***Properties of matter***, 15th edition, Eurasia publishing house (Pvt.) Ltd, New Delhi, 2007, p. 574.
3. Brij Lal & Subrahmanyam, ***Heat and Thermodynamics***, 9th edition, S. Chand & Company Ltd, New Delhi, 2007, p. 453.
4. Brij Lal & Subrahmanyam, ***A text book of Optics***, 11th edition, S. Chand & Company Ltd, New Delhi, 2003, p. 668.
5. D.S Mathur, ***Elements of Properties of matter***, 27th edition. Shyamlal Charitable Trust, New Delhi, 2009, p.413.
6. Dr. G. Ahmed, ***Physics for Engineers-I***, 1st ed. Dhaka: Hafiz Book Centre, 2009, p. 910.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: PHY-1201 **Course Title: Physics II (Electromagnetism, Optics and Modern Physics)**

Credit Hours: 3 **Contact Hours**: **3 per Week**

[Pre requisite: PHY-1101]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**

	SEE: Semester End Examination	**50 Marks**

Objectives: In this course student will learn about 'Physics' in regards to charge and electric potential, magnetic field, electromagnetic induction, current and resistance, structure of matter, relativity, modern physics and radioactivity

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Identify the basic knowledge of different areas of physics as well as engineering aspect.	PLO-2	Cognitive/ Analyzing,
CLO -2	Design solution for physics problems that meet the specified needs for public health and safety, societal and environmental concerns.	PLO-3	Cognitive/ Evaluating

Section –A (Mid-term Exam: 30 Marks)

1. **Charge and Electric Potential**: Electric charge, conductors and insulators, Coulomb's law, electric field, Electric field strength, Gauss's law and its applications, electric potential and potential function, electric dipole, dielectrics in Gauss' law.
2. **Magnetic Field:** The definition of magnetic field **B,** magnetic force on charge and current, Ampere's law, Biot-Savart law and their application, Lorentz force and its application in CRT.
3. **Electromagnetic Induction:** Faraday's law of electro-magnetic induction, Lenz's law, self and mutual induction, energy density in the magnetic field.

Section- B (SEE: 50 Marks)

Group- A (20-Marks)

4. **Current and Resistance:** Current and current density, Ohm's law, potential difference, RC circuits, generation of alternating current and e.m.f.
5. **Structure of Matter:** Crystalline and non-crystalline solid, single crystal and polycrystalline solids, unit cell, bonds in solids, inter atomic distances, calculation of cohesive and bonding energy.

Group-B (30 Marks)

6. **Relativity:** Postulates of special theory of relativity, Lorentz transformation, time dilation and length contraction, relativity of mass, energy-mass relation, energy- momentum relation**.**
7. **Modern Physics**: Bohr"s atomic model, radius and energy of Hydrogen atom, atomic nucleus and binding energy, photo-electric effect, Compton effect, De-Broglie waves, X-ray diffraction, atomic spectra and Zeeman effect.
8. **Radioactivity:** Definition, radioactive decay laws, half-life, mean life, alpha decay, beta decay, gamma decay, cross section, nuclear fission & fusion.

Recommended Reference:

1. M.C.Saxena, V.P. Arora, and S. Prakash, ***Electricity and Magnetism***, 15th ed. Meerut: Progoti Prokashon, 1972.
2. A.K. Rafiqullah, M.S. Huq, and A. K. Roy, ***Concept of Electricity and Magnetism***, Dacca: Student's Publications, 1969
3. B. Lal and N. Subrahmanyam, ***Atomic and Nuclear Physics***, New Delhi: S. Chand and Company Ltd., 1984.
4. B. Lal and N. Subrahmanyam, ***A text book of Optics***, New Delhi: S. Chand and CompanyLtd., 1966.
5. R. Resnick and D. Halliday, ***Physics (Part II)***, New Delhi: Wiley Eastern Private Ltd., 1960, p. 1214.
6. A. Beiser, ***Concepts of Modern Physics***, 6th ed. New Delhi: TATA Mc.GR-HILL EDITION, 1963.
7. B.L Theraja, **Modern *Physics***, New Delhi: S. Chand and Company Ltd., 1985.
8. G. Ahmed, ***Physics for Engineers-II***, 1st ed. Dhaka: Hafiz Book Centre, 2009.
9. S. Prakash, ***Relativistic Mechanics***, Meerut: Pragati, Prakashan, 2000.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: PHY-1204 **Course Title: Physics Sessional**
Credit Hours: 1.5 **ntact Hours: 3 Contact hours per Week**

Objectives: In this, students will perform experiments to verify practically the theories and concepts develop in PHY1201.

S/N	**Course Learning Outcomes (COs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Demonstrate an ability to make physical measurements and report writing	PLO-1	Cognitive/ Applying
CLO-2	Demonstrate the ability to use experimental statistics to determine the precision of a series of measurements.	PLO-2,	Cognitive/ Analyzing,
CLO-3	Conduct experiments on resistivity measurement and report writing	PLLO-4	Psychomotor/ Manipulation

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: CHEM-2301 **Course Title: Chemistry**

Credit Hours: 3 **Contact Hours: 3 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: The objective of this course is

1. To classify matter by its state and bonding behavior using the Periodic Table as a reference.
2. To make predictions about the atomic structure and chemical properties of the elements based in their position in the periodic table.
3. To identify the patterns in bonding, molecular geometry, and chemical reactions.
4. To understand the principles of kinetics and thermodynamics as applied to the rates and equilibrium positions of chemical reactions.
5. To use quantitative measures of solution concentration in describing colligative, acid-base, solubility, and electrochemical principles of aqueous solutions.
6. To apply quantitative reasoning skills to determine quantities of matter and energy involved in physical and chemical changes.
7. To explain the physical properties of solids, liquids, gases, and solutions.

S/N	**Course Outcomes (COs):** Upon the successful completion of the course, students will be able to	Corresponding POs	Bloom's taxonomy domain/level
CO-1	Develop the chemical engineering idea and understanding of the chemical behavior, physical properties of the common substances.	PO-1	Cognitive/ Understanding
CO-2	Demonstrate the basic proficiency to solve the chemical problems and discussing the interactions between matter and energy at the atomic and molecular levels.	PO-2	Cognitive/ Analyzing

Section –A (Mid-term Exam: 30 Marks)

1. **Periodic Classification of Elements:** Modern periodic table, Periodic law, Periodic system, Correlation of Atomic structure with periodic properties of elements, Ionization potential, Electron affinity, Electronegativity, Atomic and ionic radii, Properties of oxides.
2. **Electronic Theory of Elements:** Different types of bonds, ionic, covalent, co-ordinate and hybridization of atomic orbitals, bonding in simple molecules, Elementary idea about MOT.
3. **Chemistry of Transition Elements, Lanthanides and Actinides:** Definitions, Electronic configurations, general properties.

Section-B (SEE -50 Marks)

Group-A (20 Marks)

4. Electrochemistry: Electrolytic dissociation, Theory of electrolytic conductance. Ionic mobility and transference number, Simple ideas about electrode potential and reversible cells.

5. **Types and properties of solutions:** Units of concentration, ideal and real solutions, Henry's Law, Distribution of solids between two immiscible liquids, Distribution law, Partition coefficient and solvent extraction, Properties of dilute solutions.

Group-B (30 Marks)

6. Chemical Equilibrium: Law of mass action, Determination of equilibrium constant, heterogeneous and homogeneous equilibrium, Le Chateilar principle and Van Hoff equation.

7. Chemical Kinetics: Order and molecularity kinetics of first and second order reaction, Determination of order of reactions, Arrhenius equation and energy of activation,

8. Surface Chemistry and Colloids: Adsorption, Langmuir and Gibbs adsorption isotherm, Colloids, Definitions of terms, Electrodialysis, Classification, Preparation and properties of colloids, Elementary idea about emulsions and gels. Importance of colloids,

Recommended Reference:

1. R. D. Madan, ***Modern Inorganic Chemistry***, Rev. ed., India: New Delhi, S. Chand Publications, 2014.
2. S. Z. Haider, ***Introduction to Modern Inorganic Chemistry***, 3 rd ed., Bangladesh: Dhaka, Edexcel Publications, 2008.
3. Arun Bhal, B. S. Bhal & G. D Tuli***, Essentials of Physical Chemistry***, India: New Delhi, S. Chand Publications, 2010.
4. M. Mahbubul Hoque & M. Ali Nawab, ***Principles of Physical Chemistry***, Fully Rev. ed., Bangladesh: Dhaka, Nawab Publications, 2005.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: CHEM-2304 **Course Title: Chemistry Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. Activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives:

1. Describe processes and procedures used in the scientific method.
2. Differentiate terms such as observation, hypothesis, data, conclusion, theory, precision and accuracy.
3. Balance simple chemical reactions.
4. Perform basic stoichiometric calculations to determine the quantity of products given various quantities of reactants.

5. Use quantitative measures of solution in different units of concentration.
6. Apply quantitative reasoning skills to determine quantities of matter and energy involved in physical and chemical changes.
7. Explain the physical properties of solids, liquids, gases, and solutions.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Developing the knowledge in effective laboratory procedures such as transfer of solids, weighing of solids, pouring of liquids and measurement of liquid volume and solving the quantitative problems (stoichiometric involving chemical formulas and equations.	PLO-2	Cognitive/ Analyzing,
CLO -2	Investigate complex problems related to molarity normality to Calculate the different units of concentration of solution such as molarity, normality, molality etc. and summarize the results of experimental observations and data.	PLO-4	Cognitive/ Analyzing
CLO -3	Communicate effectively about experiment, write effective reports and make effective presentation in the lab classes.	PLO-10	Affective/ Responding

Recommended Reference:

1. John Mendham & Arthur Vogel, ***Vogel's Textbook of Quantitative Chemical Analysis***, Harlow: Prentice Hall, 2000. [Online]. Available: worldcat.org.
2. Robert De. Levie, ***Principles of Quantitative Chemical Analysis***, Rev. ed., America: New York, McGraw-Hill, 1997.
3. S. K. S. Hazari, ***Principles Qualitative and Quantitative Chemical Analysis***, Rev. ed., Bangladesh: Dhaka, Brothers Publications, 2010.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

C. Engineering Core Courses

Course Code: CSE-1105 **Course Title: Computer Programming I**
Credit Hours: 2 **Contact Hours: 2 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives:

1. To gain experience about structured programming
2. To help students to understand the implementation of C language
3. To understand various features in C

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Demonstrate an understanding of basic programming in C, Programming style, variables and data types.	PLO-1	Cognitive/ understanding
CLO-2	Apply basic programming laws and rules to complex cases like; Logical expressions and control constructs: if-else, switch, arithmetic.	PLO-3	Cognitive/ Applying
CLO-3	Analyze basic terms like: Sorting, Searching and Geometric.	PLO-3	Cognitive/Analyzing

Section-A (Mid-term Exam: 30 Marks)

1. **Introduction to digital Computers:** Basic organization and functional units of computer – Input, Output, Memory and Central Processing Unit; Different number systems & their conversion; Basic concepts of logic gates, truth table.
2. **Computer Programming**: Definition of software, its classification; Problem solving steps; Flow charts;
   Introduction of C: history and Characteristics of C, Identifiers and keywords, data types, constants, variables, statements, symbolic constant
3. **Operators**: arithmetic, unary, relational, logical, assignment, conditional operators; precedence of operators, expressions, type conversions, bitwise operations.
   Input and Output: Managing data input (scanf, getchar, gets etc), Managing data output (printf, putchar, puts etc), formatted input and output

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **Control statements:** Branching- *If* and *if… else* statements, nested if, *switch statement*; Looping- *while*, *do…while* and *for* looping statements, Jumps in loops, g*oto* statement, *break* and *continue statement.*
5. **Function:** defining a function, accessing a function, function prototypes, passing arguments to a function, Recursions, Storage class

Group-B (30 Marks)

6. **Array:** defining an array, processing an array, passing arrays to functions, Multidimensional array, String, Array of Strings;
7. **Structure**: defining a structure, processing a structure, structure and pointers, passing structures to functions, self-referential structure, Union, Enumeration
8. **Pointers**: pointer declarations, operations on pointers, Pointers and arrays, Pointers and functions, Dynamic memory allocation
   File: opening and closing a file, creating a file, processing a file

Recommended Reference:

1. Gottfried, B, ***Schaum's Outline of theory and problems of programming with C***, 4th ed, New York: McGraw-Hill, 2007.
2. Kernighan, B. and Ritchie, D, ***The C programming language***,4th ed, United States, Englewood Cliffs, N.J.: Prentice-Hall,1988.

3. Schildt, H, ***Turbo C/C++***, 3rd ed, United States, Berkeley: McGraw-Hill, 1992.
4. Balagurusamy, E, ***Programming in ANSI C***,6th ed, India, Tata McGraw-Hill Education, 2002.
5. Schildt, H., ***Teach Yourself C***, 3rd ed, United States, Tata McGraw-Hill Education, 1998.
6. Lafore, R, ***C Programming using Turbo C++,*** 4th ed, United States, Sam's Publication, 1993.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: CSE-1106 **Course Title: Computer Programming I Sessional**
Credit Hour: **1** **Contact Hour: 2 per week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. Activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will learn programming using basic "C programming software" and perform the applications of the theories learned in CSE-1105 course.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	**Apply** the fundamental Basic essential concepts, programming style, rules of data types etc. in practical engineering.	PLO1	Cognitive/ Applying
CLO-2	**Design** and conduct algorithm, as well as to analyze and	PLO3	Cognitive/ Creating

	Logical expressions.		
CLO -3	Enhance programming **skills** and understanding of techniques for engineering career.	PLO3	Psychomotor / Manipulation

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: CSE-1205 **Course Title: Computer Programming II**
Credit Hours: 2 **Contact Hours: 2 per Week**
[Prerequisite: CSE-1105]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Course Objectives:

1. Be familiar with basic techniques of algorithm analysis.
2. Be familiar with writing recursive methods.
3. Master the implementation of linked data structures such as linked lists and binary trees.
4. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure.
5. Be familiar with several sub-quadratic sorting algorithms including quicksort, merge sort and heapsort.
6. Be familiar with some graph algorithms such as shortest path and minimum spanning tree.
7. Master analyzing problems and writing program solutions to problems using the above techniques

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding POLs	Bloom's taxonomy domain/level
CLO -1	Demonstrate an **understanding** of Basic object-oriented programming.	PLO-1	Cognitive/ Understanding
CLO -2	**Apply** basic object-oriented programming laws and rules to complex cases like; Logical expressions and control constructs.	PLO-2	Cognitive/ Applying
CLO -3	**Analyze** basic terms like: Sorting, Searching and Geometric.	PLO-2	Cognitive/ Analyzing

Section-A (Mid-term: 30 Marks)

1. Introduction: Definition of OOP, Introduction to Classes and Objects, Basic concept of Object Oriented Programming, Difference between Structured Programming and Object Oriented Programming, Benefits of OOP, Characteristics of Object Oriented Programming and Application of Object Oriented Programming.
2. **Class & Object:** Constructor and Destructor, Constructors with parameters, In-line functions, Automatic in-line functions, passing objects to functions, Returning objects from function, Friend functions.
3. **Function Overloading:** Overloading function, Constructor Overloading, copy constructor, Default arguments, Overloading ambiguity

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **Operator Overloading**: Binary operator overloading, Unary operator overloading, Operator overloading using friend functions, Limitations of operator overloading.
5. **Inheritance:** Defining derived classes, Single inheritance, multiple inheritance, multilevel inheritance, Hierarchical inheritance, Virtual base classes.

Group-B (30 Marks)

6. **C++ I/O System:** Streams, Unformatted I/O, formatted I/O, I/O manipulators, File I/O streams, Opening and closing files.
7. **Virtual Functions:** Applying Polymorphism using virtual functions, Pure Virtual functions, Abstract classes, early binding, and late binding.
8. Template, Exception Handling and Standard Template Library: Generic functions, Generic classes, Exception handling, Structure of STL, Generic Containers (C++ string class, vector, deque, list, stack, queue, priority queue, pair, map etc.), Generic Algorithms (find, binary search, sort etc.).

Recommended Reference:

1. Schildt,H, ***Turbo C++,*** 3rd ed, United States, Berkeley: McGraw-Hill, 2012.
2. Balagurusamy, E, ***Object-Oriented Programming with C++,*** 3rd ed, India, Tata McGraw-Hill Education, 2013.
3. Schildt, H, ***Teach Yourself C++***, 3rd ed, United States, Tata McGraw-Hill Education, 2008.
4. Lafore, R, ***Object Oriented Programming in C++,*** 3rd ed, United States, Sam's Publication, 2002.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the				

	semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: CSE-1206 **Course Title: Computer Programming II Sessional**
Credit Hours: 1 **Contact Hours: 2per week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objective: In this course students will learn programming using advance programming software and perform the use of the concepts learned in CSE-1205 course.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	**Apply** the fundamental basics of object-oriented programming essential concepts, programming style, rules of data types etc. in practical engineering program.	PLO-1	Cognitive/ Applying
CLO-2	**Design** algorithm to analyze logical expressions.	PLO-3	Cognitive/ Creating
CLO-3	Enhance programming **skills** to solve engineering problems.	PLO-2	Psychomotor / Manipulation

Recommended Reference:

1. Schildt,H, ***Turbo C++,*** 3rd ed, United States, Berkeley: McGraw-Hill, 2012.
2. Balagurusamy, E, ***Object-Oriented Programming with C++***, 3rd ed, India, Tata McGraw-Hill Education, 2013.
3. Schildt, H, ***Teach Yourself C++***, 3rd ed, United States, Tata McGraw-Hill Education, 2008.
4. Lafore, R, ***Object Oriented Programming in C++***, 3rd ed, United States, Sam's Publication, 2002.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: ME-2301 **Course Title: Fundamental of Mechanical Engineering**
Credit Hours: 2 **Contact Hours: 2 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives:

1. To familiarize with fluid properties and measuring the loss of head flowing through pipes.
2. To understand the application of Bernoulli's equation.
3. Introducing different parts and types of IC engine along with maintenance factors.
4. To learn the basic terms of thermodynamics.
5. To familiar and design Refrigeration & Air conditioning System with applications.
6. To learn different Turbines functions and principles.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Achieve current **knowledge**, ideas and the conceptual framework of Mechanical engineering.	PLO-1	Cognitive/ Understanding
CLO -2	Demonstrate proficiency in solving basic mechanical Engine design problems.	PLO-2	Cognitive/ Evaluating
CLO -3	Design of basic Mechanical Engine for application specific troubleshooting, identifying problem and providing solution for the sustainable development of the society.	PLO-3	Cognitive/ Analyzing

Section –A (Mid-term Exam: 30 Marks)

1. **Properties of fluid:** Specific weight, Newton's law of viscosity, Compressibility and bulk modulus.
2. **Fluid Statics and Fluid kinematics:** Equilibrium of Floating Bodies, Forces on submerged planes impulse momentum principals, Types of Fluid Flow, Types of Flow Lines, Continuity Equation.
3. **Fluid Pressure and its Measurement:** Pascal's law, Manometer, Mechanical gauge. **Bernoulli's Equation:** Energy of a Liquid Motion, Practical Applications of Bernoulli's Equation. **Fluid Flow in Pipes:** Darcy's Formula, Chezy's Formula

Section-B (SEE -50 Marks)

Group-A (20 Marks)

4. **Power plant:** Vapor compression cycle, Rankine cycle,Brayton cycle Turbine, Boiler
5. **Thermodynamics basics:** Thermodynamics 1st and 2nd law, Entropy, Carnot cycle

Group-B (30 Marks)

6. **Refrigeration and air conditioning with their application:** Refrigeration system and cycle, heat exchanger and split type AC.
7. **Study of SI and CI engines:** Structure and analysis of SI & CI Engine, Cycle analysis
8. **Heat transfer:** Conduction, Convection, Radiation

Recommended Reference:

1. R. K. Rajput, ***Fluid Mechanics. And. Hydraulic Machines. (In S.I. Units)***, 4th ed., India, S. Chand & Company Ltd, 2012.
2. Michael A. Boles and Yungus A. Cengel, ***Thermodynamics: An Engineering Approach,*** 6th ed, USA, McGraw-Hill Education, 2009.
3. YUNUS A. ÇENGEL, ***Heat and Mass Transfer: Fundamentals and Applications,*** 6th

ed, USA, McGraw-Hill Education, 2020.
4. R.S. Khurmi and J.K Gupta., ***A Textbook of Refrigeration and Air Conditioning,*** 12th ed, India, S. Chand & Company Ltd, 2006.
5. P. K. Nag, ***Power Plant Engineering,*** 4th ed, India, McGraw-Hill Education, 2015

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: CE-1204 **Course Title: Engineering Drawing Sessional**
Credit Hours: 1 **Contact Hours: 2 per We**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**

Objectives: In this course student will learn to sketch (technical) the different view of an object and also learn CAD.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Understand the importance of ISO Standards in Engineering Drawing, lettering and Dimensioning.	PLO-1	Cognitive/ Understanding
CLO-2	Perform basic sketching techniques (2D & 3D) will improve through exercises in Orthographic Projection, isometric, sectional, and perspective drawing.	PLO-3	Psychomotor / Manipulation

CLO-3	Use extracts information from drawings and geometric models to solve Engineering Drawing problems.	PLO-2	Psychomotor/ Manipulation
CLO-4	Investigate and extract the information from sketching and technical drawings.	PLO-4	Cognitive/ Analyzing

1. **Introduction orthographic projection**: Scale drawing, Sectional view, Top and side view Isometric views, Missing line, Auxiliary view, Pictorial views.
2. **Drawing standard and practices:** Interpenetrating of surface, Development of surfaces, Machine drawings, and Technical sketching.
3. **Introduction to Computer Aided Design (CAD):** Project on Engineering Drawing and CAD using Contemporary packages in engineering drawing.

Recommended Reference:

1. K. Venkata Reddy,**Textbook of Engineering Drawing**, 2nd ed., India: BS Publications, 2009.
2. Amalesh Chandra Mandal, Md. Quamrul Islam., **Mechanical engineering drawing**, 1st ed., Bangladesh, Associates Printing press, 2007.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

D. EE Core Courses

Course Code: EEE-1101 **Course Title: Electrical Circuits I**
Credit Hours: 3 **Contact Hours: 3 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Electrical Circuit' in regard to comprehensive idea of circuit variables and elements, simple resistive circuits, techniques of circuit analysis, network theorems, maximum power theorem, energy storage elements, magnetic quantities and magnetic circuits.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding on current, voltage, energy, power, sources, and circuit element in a dc circuit, various network theorems, dc responses reactive circuit elements and magnetic circuits.	PLO-1	Cognitive/ Understanding
CLO-2	Apply various circuital laws, network theorems for solving dc circuits. They will also be able to solve problems related to dc response of reactive elements and magnetic circuits.	PLO-2	Cognitive/ Applying

Section-A (Mid-term Exam: 30 Marks)

1. **Circuit variables and elements:** Voltage, current, power, energy, independent and dependent sources, and resistance., Kirchhoff‟s current and voltage laws. Ammeter, voltmeter & other meters.
2. **Simple resistive circuits**: Series and parallel circuits, voltage and current division, wye-delta transformation.
3. **Techniques of circuit analysis**: Mesh and node circuit analysis including super node and super mesh. Reduction of complicated networks.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Network theorems I:** Source transformation and superposition theorem with applications in circuits having independent and dependent sources. Millman‟s theorem and reciprocity theorem.
5. **Network theorems II:** Thevenin's theorem and Norton's theorem with applications in circuits having independent and dependent sources. Maximum power transfer theorem.

Group-B (30-Marks)

6. **Energy storage elements**: Inductors and capacitors, series parallel combination of inductors and capacitors. Transient responses of R-L and R-C circuits.
7. **Magnetic quantities and variables**: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve.
8. **Magnetic circuits**: Laws in magnetic circuits: Ohm's law and Ampere's circuital law. Series, Parallel and series-parallel circuits analysis.

Recommended Reference:

1. James W. Nilsson, Susan A. Riedel, Electric Circuits, 10th ed., USA, Prentice Hall, 2015
2. Charles K. Alexander, Matthew N. O. Sadiku., Fundamental of Electric Circuits, 4th ed., McGraw Hill, 2004

3. Robert L. Boylestad, Introductory circuit analysis, Prentice Hall, 10th ed, 2002
4. Theraja, B. L., and A. K. Theraja., ***A textbook of Electrical Technology in SI Units***., S. Chand and Co., 2006.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-1102 **Course Title: Electrical Circuit I Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. Activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objective: In this course students will perform experiments to verify practically about the theories learned in the course **EEE-1101**.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Understand series-parallel circuit connection in a bread board and able to measure voltage, current, and resistance of the circuit elements using multi-meter.	PLO-1	Cognitive/ Understanding
CLO-2	Verify various network theorems and apply those theorems for solving complicated networks.	PLO-2	Cognitive/ Evaluating,
CLO-3	Develop writing and communication skill.	PLO-10	Affective/ Responding

Recommended Reference:

1. James W. Nilsson, Susan A. Riedel, Electric Circuits, 10th ed., USA, Prentice Hall, 2015
2. Charles K. Alexander, Matthew N. O. Sadiku., Fundamental of Electric Circuits, 4th ed., McGraw Hill, 2004
3. Robert L. Boylestad, Introductory circuit analysis, Prentice Hall, 10th ed, 2002

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-1201 **Course Title: Electrical Circuits II**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-1101]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Electric Circuit' in regards to comprehensive idea about alternating current, magnetically coupled circuits, three phases balanced and unbalanced load, resonance, filter, a.c. transients and two port analysis

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of alternating current waveforms, phase shifting, impedance, power factor, impedance and phasor diagram, circuit theorems for solving series-parallel circuits, poly phase system, magnetic coupling, resonance, and two port networks.	PLO-1	Cognitive'/ Understanding
CLo-2	Apply complex variable, various circuit rules and theorems for solving complex series parallel networks.	PLO-2	Cognitive/ Analyzing
CLO-3	Design various series-parallel resonant circuits, passive filters, and two port networks.	PLO-3	Cognitive/ Creating

Section-A (Mid-term Exam: 30 Marks)

1. **Sinusoidal functions**: AC theory, instantaneous current, voltage, power, effective current and voltage, average power, Use of complex quantities in AC circuits
2. **Phasors and complex quantities**: Impedance, real and reactive power, power factor, Vector diagram.
3. **Analysis of single-phase AC circuits:** Series and parallel RL and RC circuits. nodal and mesh analysis, application of network theorems.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Resonance and Passive filters**: Series and parallel RLC resonance circuits'-value and band width, Properties of Symmetrical networks, Filter fundamentals, Low, High, Band pass and Band stop Filters. Band width and cut-off frequency, Double tuned filter, Design conditions and Uses. Bode plots.
5. **Magnetically coupled circuits:** Conductive, Capacitive and Magnetic Coupling, Coefficient of Coupling.

Group-B (30-Marks)

6. **Polyphase systems**: The three-phase generator, The Y-connected generator and load, the Wye-Delta system, The Delta connected generator and load, Delta-Delta and Delta-Wye three phase system.
7. **Balanced and unbalanced three phase circuit analysis**: The three and two wattmeter methods, unbalanced three –phase four-wire Y-connected load, unbalanced three-phase three wire Y-connected load.
8. **Two-port analysis**: Impedance parameters, Voltage gains, Current gains, Cascaded systems, admittance parameters, Hybrid parameters.

Recommended Reference:

1. Corcoran, George Francis, and Henry Rouse Reed. ***Introductory electrical engineering***. Wiley, 1957.
2. Alexander, Charles K., and Matthew NO Sadiku. ***Fundamentals of electric circuits***. McGraw-Hill Education, 2000.
3. Boylestad, Robert L., and Louis Nashelsky. ***Electronic devices and circuit theory***. Prentice Hall, 2012.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-1202 Course Title: Electrical Circuit II Sessional and Electrical workshop
Credit Hours: 1.5 Contact Hours: 3 per week

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objective: In this course students will perform experiments to verify practically about the theories learned in the course **EEE-1201.**

S/N	**Course Learning Outcomes (COs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of alternating current waveform, phase shifting, impedance, power factor, impedance and phasor diagram, circuit theorems for solving series-parallel circuits, poly phase system and resonance.	PLO-1	Cognitive/Applying
CLo-2	An ability to solve complex series parallel networks to determine current, voltage, power, phasor, and impedance diagram.	PLO-2	Cognitive/Evaluating
CLO-3	Develop writing and communication skill	PLO-10	Affective/Responding

Recommended Reference:

1. Corcoran, George Francis, and Henry Rouse Reed. ***Introductory electrical engineering***. Wiley, 1957.
2. Alexander, Charles K., and Matthew NO Sadiku. ***Fundamentals of electric circuits***. McGraw-Hill Education, 2000.
3. Boylestad, Robert L., and Louis Nashelsky. ***Electronic devices and circuit theory***. Prentice Hall, 2012.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-2301 **Course Title: Electronics I**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-1201]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Electronics' in regards to the working principle and characteristics of semiconductor diodes and transistors, BJT, MOSFET, Differential and multistage amplifiers.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Knowledge of basic semiconductor device such as PN junction and Zener diode, BJT, FET, MOSFET, modeling of diodes, field-effect and bipolar junction transistors and different amplifier circuit.	PLO-1	Cognitive/ Remembering
CLO-2	Problem solving of different types of electronic circuit consisting of diode, BJT, FET, transistor amplifiers as discrete and integrated devices.	PLO-2	Cognitive/ Analyzing
CLO-3	Design and modeling of BJT, FET, MOSFET, differential and simple amplifier circuits and their small signal, large signal and frequency response performance.	PLO-3	Cognitive/ Creating

Section-A (Mid-term Exam: 30 Marks)

1. **Semiconductor Diodes**: Intrinsic and extrinsic semiconductors, N and P type semiconductor, current-voltage characteristics of a PN junction diode. Simplified dc and ac diode models, dynamic resistance and capacitance.
2. **Diode Circuits**: Half wave and full wave rectifiers, rectifiers with filter capacitor, Voltage doubler, Clippers and clampers circuits. Zener diode and Voltage regulators.
3. **Bipolar Junction Transistors**: Working principle of PNP and NPN transistor, Input and output characteristics of CB, CE, and CC configuration, Load line analysis, Operating point, cutoff and saturation points, Transistor as an amplifier, BJT as a switch. Transistor biasing and stability factor, design of transistor biasing circuit.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Single Stage Transistor Amplifier**: Transistor equivalent circuits (both D.C and A.C). Modeling of Transistor: r_e-model and Hybrid equivalent Model. Small-signal analysis of BJT: Fixed biased, voltage-divider biased and Emitter-Follower Configuration.
5. **Differential and multistage amplifiers**: Description of differential amplifiers, Small-signal operation, differential and common mode gains, RC coupled, Transformer coupled, and Direct Coupled amplifier.

Group-B (30-Marks)

6. **Field-Effect Transistors (FET)**: Construction and classification, Principle of operation, Characteristic curves, Channel conductivity, Channel ohmic and pinch-off region, Characteristic parameters of the FET, Effect of temperature on FET, Common source amplifier, Common drain amplifier,
7. **Metal-oxide-semiconductor field-effect-transistor(MOSFET)**: MOSFET as circuit element, structure and physical operation of an enhancement MOSFET, threshold voltage, Body effect. Current- voltage characteristics of an enhancement MOSFET, MOSFET as a switch.
8. **Biasing and Application of MOSFET**: Biasing discrete and integrated MOS amplifier circuits. VMOS, CMOS inverter. UJT.

Recommended Reference:

1. Adel S. Sedra & Kenneth C. Smith, ***Microelectronic Circuits***, 7th ed., USA: OXFORD UNIVERSITY PRESS, 2015.
2. Robert L. Boylestad & Louis Nashelsky, ***Electronic Devices and Circuit Theory***, 11th ed., USA: Pearson Education, Inc, 2013.
3. Ben G. Streetman & Sanjay Banerjee, ***Solid State Electronic Devices***, 6th ed., USA: Pearson Prentice Hall, 2006.
4. J. Millman & C.C Halkias, ***Electronic Devices and Circuits***, International Student ed.,

USA: Tata Mc-Graw Hall, 1967.
5. V.K. Mehta & Rohit Mehta, ***Principle of Electronics***, 11th ed., India: S. Chand Publishing, 2008.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-2302 **Course Title: Electronics I Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examin ation **(SEE)**

Objective: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts develop in EEE-2301. In the second part, students will design simple systems using the principles learned in EEE-2301.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect the understanding of basic semiconductor device such as PN junction and Zener diode, field- effect and bipolar junction transistors and different amplifier circuit.	PLO-1,	Cognitive/ Understanding
CLo-2	An ability to solve complex biasing electronic circuits to determine current, voltage and analyze the voltage - current relationship.	PLO-2,	Cognitive/ Evaluating
CLO-	Develop writing and communication skill.	PLO-10	Affective/

3			Responding

Recommended Reference:

1. Adel S. Sedra & Kenneth C. Smith, ***Microelectronic Circuits***, 7th ed., USA: OXFORD UNIVERSITY PRESS, 2015.
2. Robert L. Boylestad & Louis Nashelsky, ***Electronic Devices and Circuit Theory***, 11th ed., USA: Pearson Education, Inc, 2013.
3. V.K. Mehta & Rohit Mehta, ***Principle of Electronics***, 11th ed., India: S. Chand Publishing, 2008.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-2303 **Course Title: Electrical Machine I**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-1201]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course students will learn about 'Electric Machine' in regards to working principle, construction, characteristics and maintenance of different types of transformers and motors.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic **understanding** of Transformer.	PLO-1	Cognitive / Understanding
CLO-2	Develop the idea regarding the electrical equivalent circuit of different machines and will be able to solve related mathematical problems.	PLO-2	Cognitive / Applying
CLO-3	Demonstrate basic proficiency in building transformers and operating motors and generators.	PLO-1	Cognitive / Understanding

Section-A (Mid-term Exam: 30 Marks)

1. Transformer: Working principle, Construction, Types- (core type & shell type), Elementary theory for ideal transformer, E.M.F. equation, Transformation ratio, three phase transformer- (Operating principle, Different types of connection).

2. Vector diagram and Equivalent circuit: Transformer with losses but no magnetic leakage, Transformer with winding resistance but no magnetic leakage, Transformer with resistance and leakage reactance, Equivalent circuit of a transformer.
3. Transformer test & Performance: Voltage regulation, Transformer tests- (open-circuit & short-circuit test), Losses in a transformer, Efficiency & condition for maximum efficiency, Instrument transformer- (current & voltage Transformer).

Section B (SEE: 50 Marks)
Group A (20 marks)

4. **DC generators**: Working Principle of generators, Different types of DC generators, General Voltage Equation, no-load voltage characteristics and Application of DC generators. Build-up of a self-excited shunt generator, critical field resistance, load-voltage Characteristic.
5. DC generator characteristics: Effect of speed on no-load and load characteristics and voltage regulation. Shunt generator and compound generator. Parallel operation, winding connection of DC generator

Group-B (30-Marks)

6. DC motors: Operating differences between motors and generators, Torque, counter emf, speed and torque-speed characteristics, starting and speed regulation, Uses of DC motors.
7. Induction motor: Theory of operation, Advantage, Disadvantage, Construction, Production of rotating field- (two-phase & three-phase supply) & mathematical proof, Rotation principle, Slip, Frequency of rotor current.
8. Equivalent circuit: Induction motor as a generalized transformer, Equivalent circuit of the rotor, Equivalent circuit of the motor, Determination of G_0 & B_0, No load test, Blocked rotor test.

Recommended Reference:

1. B.L. Theraja & A.K Theraja, ***A Text Book of Electrical Technology (Volume II)***, 23rd ed., India, S Chand,1959.
2. Stephen J. Chapman, ***Electric Machinery Fundamentals***, 4th ed., United States, McGraw Hill,1985.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-2306 **Course Title: Numerical Techniques Sessional**
Credit Hours: 1 **Contact Hours: 2 per Week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will perform experiments to verify practically about numerical methods, numerical errors calculation, solution of non-linear equation, interpolation, numerical differentiation and integration curve fitting and solution of differential equation.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic **understanding** of MATLAB programming and its application for various numerical techniques.	PLO-1	Cognitive/ understanding
CLO-2	**Apply** MATLAB software for programming various numerical techniques for solving various engineering problems.	PLO-2	Cognitive/ Applying

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-2401 **Course title: Electrical Machine II**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-2303]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Electric Machine' in regards to working principle, construction, operation of AC Machine along with their characteristics and stability.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level

CLO -1	**Understand** and mastery of the basic concepts operations of different types of DC, AC motors and special machines (C)	PLO-1	Cognitive/ Understanding
CLO -2	**Knowledge** of machine control and electrical drives and their applications (C)	PLO-2	Cognitive/ Applying,
CLO -3	Ability to calculate and **design** electrical machines (P)	PLO-3	Cognitive/ Evaluate

Section-A (Mid-term Exam: 30 Marks)

1. Torque and speed: Relation between torque and rotor power factor, Starting torque, Effect of supply voltage on starting torque, Rotor EMF, reactance & torque under running condition & condition for maximum torque, Relation between torque and slip, Effect of change in supply frequency on torque and speed, Torque/Speed curve, Shape of Torque/Speed curve, Relation between starting and full load torque.

2. **Diode Circuits**: Half wave and full wave rectifiers, rectifiers with filter capacitor, Voltage doubler, Clippers and clampers circuits. Zener diode and Voltage regulators.

3. Starter and Speed Control induction motor: General principle, Double field revolving theory, Starting of Induction motor- (direct switching, primary resistors & star-delta starter), Making it self-starting (split phase & capacitor start), Equivalent circuit (with & without Cu loss), Speed control of Induction motors.

Section B (SEE: 50 Marks)

Group A (20 marks)

4. Synchronous generator: Construction, rotor speed & frequency, EMF generation, excitation systems, equivalent circuit, loads factors affecting voltage regulation, maximum power output. Synchronous impedance, synchronous impedance method of predicting voltage regulation and its limitations, parallel operation: Necessary conditions, synchronizing,

5. Synchronous motor: Operation, effect of loading under different excitation condition, effect of changing excitation, V-curves and starting, Circulating current and vector diagram.

Group-B (30 Marks)

6. Universal motor: Introduction, Type, Construction, Operation, Speed/Load characteristics, Applications, Reversal of rotation, Speed control. **Permanent Magnet DC motor:** Introduction, Construction, Operation, Properties of Permanent magnets, Types of permanent magnets used for motor, Performance, Speed control, Advantage, Disadvantage, Application, Elementary theory, Equation for Maximum power. **Brushless DC motor:** Introduction, Disadvantage of Brush, Advantage of BLDC, Disadvantage, Application, Comparison of conventional and brushless DC motor, Drive circuit:- (unipolar & bipolar).

7. Stepper motor: Introduction, Advantage, Step angle, Resolution, Speed, Application, Types: - (variable reluctance, permanent magnet, hybrid), Variable reluctance stepper motor: - (construction, full-step operation, 2-phase on mode, half-step operation).**Permanent Magnet Synchronous motors:** Introduction, Types of magnets used, Classification, Advantage, Application.

8. Synchros: Introduction, Types, Application: - (torque transmission, error detection), Control differential transmitter, Control differential receiver. **Linear motor and traction:** Introduction, Linear induction motor: - (construction, operation, types, disadvantage, application); Magnetic levitation.

Recommended Reference:

1. Rosenblat & Friedman, Direct & Alternating current Devices.
2. Stephen J. Chapman, Electric Machinery Fundamentals.
3. B.L. Thereja & A.K.Thereja, A text book of Electrical technology (Vol-II).

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-2402 **Course Title: Electrical Machine Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**

Objectives: In this course students will perform experiments to verify practically about the theories learned in the course **EEE-2303 & EEE-2401.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CO-1	Apply knowledge of mathematics, science, and engineering to understand the basic construction and principle of machine.	PLO-1	Cognitive/ **Apply**
CLO-2	Conduct experiments, as well as to **Analyze** and interpret data.	**PLO-4**	Psychomotor / Manipulation
CLO-3	**Communicate** effectively through report writing and presentation.	PLO-10	Affective/ Responding

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for

attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE 2407 **Course Title: Digital Electronics**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-2301]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Digital Electronics' in regards to introduction to number systems, minimization of Boolean functions, implementation of basic static logic gates in CMOS and BiCMOS, power optimization of basic gates and combinational logic circuits, combinational logic with MSI and LSI, sequential Logic, counter design and register and memory unit.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Will have knowledge on Number system, Boolean algebra and different types of Combinational and Sequential circuits.	PLO-1	Cognitive/ Understanding
CLO-2	Analyze different digital electronics circuits in terms of different systems of Boolean expression and their simplification, truth table, state table etc.	PLO-2	Cognitive/ Analyzing
CLO-3	Solve various problems related to digital electronics and design circuits like adder, comparator, converter, decoder, encoder, ROM, PLA, counter, register etc.	PLO-3	Cognitive/ Creating

Section A (Mid-term Exam: 30 Marks)

1.Introduction to number systems: Binary, Octal, hexadecimal Numbers, Number Base Conversions, Complements, Binary Codes, Basic logic functions, Boolean Algebra, Canonical and standard forms, BCD numbers, Digital logic gates, Digital logic families (DTL, RTL, TTL, ECL, MOS)

2.Minimization of Boolean Functions*:* Forms of Boolean functions, Shannon's theorem, Minimization of Boolean functions using Karnaugh map, Quine Mclusky method, Iterative consensus method, Implementation of switching functions (Using various gates: NOR, NAND, AND - OR- INVERT).

3. Implementation of basic static logic gates in CMOS and BiCMOS: DC characteristics, noise margin and power dissipation; Combinational Logic: Design of combinational circuits (Adders, Subtractors, Code Conversion)

Section B (SEE: 50 Marks)

Group A (20 marks)

4. Power optimization of basic gates and combinational logic circuits: Modular combinational Circuit Design; pass transistor, pass gate, Half adder, Full adder, multiplexer, demultiplexer and their implementation in CMOS.

5. Combinational logic with MSI and LSI: Difference between combinational circuits and sequential circuits, Decoder, encoder, comparators, binary arithmetic elements and ALU design; Programmable logic devices: logic arrays, field programmable logic arrays and programmable read only memory.

Group B (30 Marks)

6. Sequential Logic: Difference between combinational circuits and sequential circuits, Types of sequential circuit, Flip-Flops (Basic flip-flop circuit, clocked RS flip-flop, D flip-flop, JK flip-flop, T flip-flop), Triggering of Flip-flop, Analysis of clocked sequential circuits (state table, state diagram, state equations), state reduction, state assignment.

7.Counter Design: Types of counters, Design of synchronous and asynchronous counter, MOD number, Propagation delay in Ripple counter, Ring counter, The Johnson Counter, Asynchronous down counter, Digital clock.

8.Register and Memory unit*:* Basic shift register, Serial In/Serial out shift registers, Serial In/Parallel out shift register, Parallel In/Serial out shift register, Bidirectional shift register, Integrated circuit memory, Magnetic-core memory.

Recommended Reference:

1. M. Morris Mano, ***Digital Logic and Computer Design***, 7th printed, India: Pearson, 2018.
2. Ronald J. Tocci, ***Digital Systems: Principles and Applications***, 10th ed., India: Pearson, 2009.
3. Thomas L. Floyd, ***Digital Fundamentals***, 11th ed., India: Pearson, 2017.
4. Mozammel Haque Azad Khan, ***Digital Logic Design***, 1st ed., Bangladesh: Bangladesh University Monjuri Commission, 2006.
5. Stephen Brown & Zvonko Vranesic, ***Fundamentals of Digital Logic with Verilog Design***, 3rd ed., India: McGraw Hill Education, 2013.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-2408 **Course Title: Digital Electronics Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**
Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts developed in EEE-2407. In the second part, students will design simple systems using the principles learned in EEE-2407.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Reflect a basic **understanding** of digital logic gate and Ics.	PLO-2	Cognitive/ Understanding
CLO -2	**Design** of different combinational and sequential logic circuits through **simulation** and implementation using digital Ics.	PLO-3	Psychomotor / Precision
CLO -3	**Apply** the necessary skills in digital computer design and digital signal processing.	PLO-5	Cognitive/ Applying

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-2411 **Course Title: Electronics II**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-2301]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Electronics' in regards to working principle, operational characteristics of operational amplifiers, oscillators, power amplifiers, feedback amplifiers, active filter, optoelectronic and microwave devices**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO	Reflect a basic understanding of Electronic circuits and	PLO-1	Cognitive/

-1	Devices such as Operation Amplifier, Negative Feedback, Power Amplifiers, Oscillators, Active Filters, Optoelectronic Devices, and Amplifier Frequency Response.		Understanding
CLO -2	Solve different problems related to Electronic circuits and Devices.	PLO-2	Cognitive/ Evaluating
CLO -3	Design and development of different Electronic circuits and Devices.	PLO-3	Cognitive/ Designing

Section-A (Mid-term Exam: 30 Marks)

1. **Operation Amplifier**: Introduction to operational amplifier, input signal modes of Op-amp, CMRR, Op-amps with negative feedback, Inverting and Non inverting Amplifier. Frequency response of Op-amp, IC- Op-amp, Application of op-amp (Summing, Differentiator and Integrator)
2. **Negative Feedback**: Properties and topologies of Negative Feedback, Effect of feedback on impedance, Gain, bandwidth, distortion and stabilization.
3. **Power Amplifiers**: Classification of power amplifiers, Collector efficiency, Transformer coupled class A amplifier; Class-B push-pull amplifier, Class-C amplifier, Tuned amplifier, class D, E & S amplifier.

Section-B (SEE: 50 Marks)

Group-A (20 Marks)

4. **Oscillators**: Introduction to Oscillator, Positive feedback, Condition of Oscillator, Phase Shift Oscillator, The Wein-Bridge Oscillator, Resonant circuit Oscillators. Crystal Oscillator, VCO, Introduction to 555 Timer and its operation, Waveform generator
5. **Low Frequency Amplifier Response:** Amplifier Frequency Response, Effect of Coupling, Internal Capacitances in case of BJT amplifier, Miller's Theorem, Decibel, 0dB References, Bode Plot, The Critical Frequency, Low Frequency Amplifier Response,

Group-B (30-Marks)

6. **High Frequency Amplifier Response**: High Frequency Amplifier Response, Total Frequency Amplifier Response. Amplifier noises. Gain, Bandwidth, Distortion& Stabilization.
7. **Active Filters**: Explanation of Low, High, Band Pass and Band Stop Filter Response, Response Characteristics, Damping Factor, Critical Frequency and Roll-Off Rate, Single Pole Filter, Sallen-Key Low Pass and High Pass filter, Cascaded Filter, Multiple Feedback Band-Pass and Band Stop Filter, State Variable Band-Pass and Band Stop Filter,
8. **Optoelectronic Devices:** PN photodiode, Phototransistor, Solar cell, Photoconductive cell, Photovoltaic, Sensors, LED, LCD, Alphanumeric display, Photo couplers, Photodiode, LDR.

Recommended Reference:

1. Thomas L.Floyd, ***Electronic Devices***, 9th ed., New Jersey, United States of America, Prentice Hall, 2012
2. Robert Boylestad, Louis Nashelsky, ***Electronic Devices and circuit theory***, 7th ed, New Jersey, United States of America, Prentice Hall.
3. B.L Theraja, A.K Theraja, ***Electrical Technology***, Vol 4, 23rd ed, India, S. Chand.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10

Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-2412 **Course Title: Electronics II Sessional and Electronic Workshop**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts developed in EEE-2411. In the second part, students will design simple systems using the principles learned in EEE-2411.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Able to apply the knowledge of electronic devices and circuits.	PLO-1	Cognitive/ Understanding,
CLO-2	Design and development of different Electronic circuits and Devices.	PLO-3	Psychomotor/ Manipulation
CLO-3	Develop communication skill.	PLO-10	Affective/ Responding
CO-4	Function effectively as a member of team.	PO-9	Affective/ Organization

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-2415 Course Title: Transmission & Distribution of Electrical Power System

Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-1201]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: The objective of the course is to make the student familiar with the transmission and distribution of electrical energy from the places of production to consumer areas and isolated consumers in order to be able to appreciate the relative procedures from the technical, economic and social point of view.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Develop the idea to deliver quality power to the end users using Transmission and Distribution System.	PLO-1	Cognitive/ Understanding
CLO-2	Ability to apply various voltage control techniques to maintain proper voltage at the level of end users.	PLO-2,	Cognitive/ Applying,
CLO-3	Modelling of the transmission and Distribution line to analysis the effect of line parameters on the power flow.	PLO-3	Cognitive/ Analyzing

Section– A (Mid-Term Exam: 30 Marks)

1. **Transmission systems:** Types of conductors, resistance, definition of inductance, inductance of conductor due to internal flux, flux linkages between two points external to an isolated conductor, inductance of a single phase two wire line.
2. **Capacitance of transmission lines:** Capacitance of a three-phase with equilateral spacing and unsymmetrical spacing, effect of earth on the capacitance of three-phase transmission lines, bundled conductors, parallel-circuit three-phase lines.
3. **Current and voltage relations on a transmission line:** Representation of lines, the short transmission line, the medium transmission line the long transmission line, solution of differential equation, interpretation of the equations, hyperbolic form of the equations, the equivalent circuit of a long line, direct current transmission.

Section-B (SEE: 50 Marks)
Group-A (20-Marks)

4. General line equation in terms of ABCD constants, relations between constants, charts of line constants, constants of combined networks, measurement and advantages of generalized line constants. **Power circle diagram:** Receiving and sending end power circle diagrams, transmitted maximum power, universal power circle diagrams, use of circle diagrams.
5. **Voltage and power factor control in transmission systems:** Tap changing transformer, induction regulators, moving coil regulators, booster transformer, power factor control, static condensers in series or parallel, synchronous condensers, Ferranti effect.

Group-B (30-Marks)

6. **Insulated cables:** Cables versus overhead lines, insulating materials, electrostatic stress grading, three core cables, dielectric losses and heating, modern developments, oil-filled and gas-filled cables, measurement of capacitance, cable testing.
7. **Insulator of overhead lines:** Types of insulators, their constructions and performances, potential distribution, special types of insulators, testing of insulators.

8. **Distribution:** Distributor calculation, copper efficiencies, radial ring mains and inter connections. Mechanical characteristics of transmission lines: Sag and stress analysis, ice and wind loading, supports at different elevations, conditions of erection, effect of temperature changes.

Recommended Reference:

1. John J. Grainger & Willam D. Stevenson, Jr, ***Elements of Power System Analysis***, 4th ed., Singapore: McGraw-Hill, Inc., 1982.
2. Ashfaq Husain, ***Electrical Power Systems***, 5th ed., New Delhi: CBS, 2017.
3. V.K. Mehta & Rohit Mehta, ***Principles of Power System***, 4th ed., India: S. Chand, 2008.
4. Hadi Saadat, ***Power System Analysis***, 2002 ed., USA: McGraw-Hill, Inc., 2002.
5. D P Kothari & I J Nagrath, ***Modern Power System Analysis***, 3rd ed., India: Tata McGraw Hill Edu. Private Ltd., 2009.
6. Turan Gönen, ***Transmission System Engineering Analysis and Design***, 2nd ed., USA: CRC Press, 2009.
7. Arthur R. Bergen & Vijay Vittal, ***Power System Analysis,*** 2nd ed., USA: Prentice-Hall, Inc., 2000.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: **CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3501 **Course Title: Continuous Signals and Linear Systems**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: MATH-2409]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Continuous Signals and Linear Systems' in regard to signals, systems and system representation, impulse response, harmonic representation, Fourier-transform, application of harmonic analysis and analogous systems.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Strengthen knowledge of about signal, system, properties of signal and system, and representation of system by means of differential equation.	PLO-1	Cognitive/ Understanding
CLO -2	Learn, analyze, and apply the important mathematical tools such as convolution, Fourier analysis, Laplace transformation for the analysis of the signals and systems of circuit applications.	PLO-2	Cognitive / Applying

Section-A (Mid-term Exam: 30 Marks)

1. **Signal**: Definitions -Signal, System, Size of signal, Signal Energy, Signal power. Classification of signals. Basic operations on signals. Elementary Signals.
2. **Systems:** Properties of system- Linearity, causality, time invariance, memory, stability, and invariability.
3. **System representation:** Differential Equations, Electrical and Mechanical System representation using Differential Equation, order of the system, Solution Techniques, Zero State and Zero Input Response.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Impulse response:** Convolution integral- determination of system properties; state variable - basic concept, state equation and time domain solution.
5. **Harmonic representation:** Fourier series- Trigonometric Fourier Series, Amplitude and Phase Spectrum, Symmetry Considerations, Exponential Fourier Series and Circuit Applications.

Group-B (30-Marks)

6. **Fourier transform:** Fourier Transform and Inverse Fourier Transform. Properties of Fourier Transform. Circuit Applications of Fourier Transform.
7. **Laplace Transform:** Laplace and Invers Laplace transform, Properties of Laplace Transform. Circuit Applications. Solution of system equations, system transfer function and frequency response.
8. **Applications:** System stability analysis using Laplace Transform, Amplitude Modulation and Demodulation, Time-division and Frequency-division Multiplexing.

Recommended Reference:

1. Simon Haykin, Barry Van Veen,***Signals and Systems***, 4th ed., Wiley, 2001-2002.
2. Alexander Sadiku, ***Fundamentals of Electric Circuits***, 4th ed., McGraw-Hill, 2009-2010.
3. B. P. Lathi, ***Principles of Linear Systems and Signals***, 2nd ed., Oxford University Press, 2005-2011.
4. Taan S. ElAli, Mohammad A. Karim, ***Continuous Signals and Linear Systems with MATLAB***, 2nd ed., CRC Press, USA, 2013.
5. Cheng, David K., ***Analysis of linear systems***, 1959.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category	Evaluations out of 100 marks	
	CIE (50 marks)	SEE (50 marks)

Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3505 **Course Title: Microprocessor and Interfacing**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-2407]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about' Microprocessor and Interfacing' in regards to digital computer, microprocessor ALU, Intel 8086 Microprocessor**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Explain the architecture and operation of microcomputer and microprocessor.	PLO-1,	Cognitive / Understanding
CLO -2	Learn assembly language programming.	PLO-2,	Cognitive / Understanding
CLO -3	Design various microprocessor-based systems according to practical applications.	PLO-3	Cognitive/ Creating

Section-A (Mid-term Exam: 30 Marks)

1. Introduction to microcomputer and Microprocessor: Microcomputer architecture, organization and its operation, Microprocessor and Microcontroller, Evolution of Microprocessor, General Architecture and operation of microprocessor (ALU, Control Unit, Register array, system bus), CISC and RISC structure, Instruction execution, Memory array design and memory interfacing.

2. Architecture of Intel 8086 Microprocessor and Addressing Modes: 8086 architecture, registers inside 8086, 8086 addressing modes (data addressing modes, program memory addressing modes and stack memory addressing modes).

3. Instruction Set of 8086 Microprocessor (Data Movement and Arithmetic Instruction): Operation of all data movement and arithmetic instructions, Assembly language programming using Instruction Set.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. Instruction Set of Intel 8086 Microprocessor (Logic and Program Control Instructions): Operation of all logic and program control instructions, Assembly language programming using Instruction Set.

5. Pin functions and operation of Intel 8086 Microprocessor and 8284A: Modes of operation and Pin functions of 8086 microprocessor, Pin functions and operation of 8284A.

Group-B (30-Marks)

6. Intel 8086 Interfacing with 8255 PPI: Introduction to Programmable Peripheral Interface (8255), Architecture, Operation, Programming.

7. **Intel 8086 Interfacing with 8254 PIT**: Introduction to Programmable Interval Timer (8254), Architecture, Operation, Programming.

8. Intel 8086 Interfacing with Other ICs and PLC: Programmable Interrupt Controller (8259), Introduction to PLC, DMA.

Recommended Reference:

1. Douglas V. Hall, ***Microprocessors and interfacing***, 3rd ed., India: Tata McGraw Hill, 2012.
2. Mohamed Rafiquzzaman, ***Microprocessors and Microcomputer-Based System Design***, 2nd ed., India: CRC Press, 1995.
3. Ramesh S. Gaonkar, ***Microprocessor Architecture, Programming, and Applications with the 8085***,6th ed., India: Penram International Publishing, 2013.
4. Myke Predko, ***Programming and customizing the PIC microcontroller***,1st ed., India: Tata McGraw-Hill, 2007

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3506 **Course Title: Microprocessor and Interfacing Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-3505. In the second part, students will design simple systems using the principles learned in EEE-3505.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	The students will be able to **apply** assembly language programming for designing microprocessor based system.	PLO-2	Cognitive/ Applying
CLO-2	They will be able to **design** various microcontroller-based systems according to practical applications.	PLO-3	Cognitive/ Creating
CLO-3	They will be able to **use** modern designing tools.	PLO-5	Psychomotor / Manipulation
CLO-4	They will be able to **communicate** effectively on complex engineering activities with the engineering community and society.	PLO-10	Affective/ Responding

Course Code: EEE-3508 **Course Title: Circuit Simulation Sessional**
Credit Hours: 1 **Contact Hours: 3 per Week**

[Pre requisite: EEE-2301]

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**

Objectives: In this course students will learn about electrical and electronic circuit simulation**.**
A. In the simulation laboratory based on EEE-1101 and EEE-1201 theory courses, students will verify the theories and concepts learned in EEE-1101 and EEE-1201 using simulation software like pspice and Matlab. Students will also perform specific design of dc and ac circuits theoretically and by simulation.

B. In Simulation laboratory based on EEE-2301 and EEE-2411 theory courses, students will verify the theories and concepts learned in EEE-2301 and EEE-2411 using simulation software like Pspice and Matlab. Students will also perform specific design of electronic circuits theoretically and by simulation.

S/N	**Course Learning Outcomes (CLOs):** Upon the	Corresponding	Bloom's

	successful completion of the course, students will be able to	PLOs	taxonomy domain/level
CLO -1	Develop idea on modeling of different electrical and electronic components/equipment.	PLO-1	Cognitive/ Applying
CLO -2	**Use modern simulation tools for solving complex engineering problems.**	**PLO-5**	Psychomotor / Precision
CLO -3	Capability to design and analyze different circuits in MATLAB Simulink environment	PLO-3	Psychomotor / Designing

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-3515 **Course Title: Electrical Properties of Materials**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-2301]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Electrical Properties of Materials' in regards to crystal structures, classical theory of electrical and thermal conduction, introduction to quantum mechanics, band theory, modern theory of metals, dielectric and magnetic properties of materials, introduction of superconductivity.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Reflect a basic understanding of crystal structure, lattice geometry, quantum mechanical behavior of electrons, molecular orbital theories.	PLO-1	Cognitive/ Understanding
CLO -2	Develop the concept of dielectric and magnetic material properties and their applications.	PLO-1	Cognitive/ Understanding

Section A (Mid-term Exam: 30 Marks)

1. **Crystal Structures**: Types of Crystals, lattice and basis, Bravias lattice and Miller indices and crystal defects.
2. **Classical theory of electrical and thermal conduction**: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Mathiessen's rule, Hall effect and thermal conductivity.

3. **Introduction to Quantum mechanics**: Wave nature of electrons, Schrodinger equation, one dimensional quantum problems-infinite quantum well, potential step and potential barrier; Heisenberg's uncertainty principle and quantum box.

Section- B (SEE: 50 Marks)

Group A (20 marks)

4. **Band theory**: Band theory from molecular orbital, Bloch theorem, Kronig-Penny model, effective mass, density of states; carrier Statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy.
5. **Modern theory of metals**: Determination of Fermi energy and average energy of electrons, classical and quantum mechanical calculation of specific heat.

Group B (30 Marks)

6. **Dielectric properties of Materials**: Dielectric constant, polarization-electronic, ionic and oriental; internal field, Clausius-Mosotti equation, spontaneous polarization, frequency dependence of dielectric constant, dielectric loss and piezoelectricity.
7. **Magnetic Properties of Materials**: Magnetic moment, magnetization, relative permittivity, different types of magnetic materials, origin of ferromagnetism and magnetic domains.
8. **Introduction of superconductivity**: Zero resistance and Meissner effect, Type I and Type II superconductors and critical current density.

Recommended Reference:

1. S. O. Kasap, Principle of Electronics Materials and Devices, 4th ed., McGraw-Hill, 2017
2. Ben G. Streetman, S. Banerjee, Solid State Electronic Devices, 6th ed., Prentice Hall, 2005

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3519 **Course Title: Power System Analysis**
Credit Hours: 3 **Contact Hours: 3 per wee**k
[Prerequisite course: EEE-2415]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Power system' in regard to underground **t**ransmission lines cables, power system stability, flexible ac transmission system, overhead transmission lines cables, series impedance of transmission lines, line parameters, factors affecting stability and power quality.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of power system modelling, effects of synchronous machines in power system, one-line diagram, network calculations, bus impedance matrix, different types of power system faults and fault calculations.	PLO-1	Cognitive/ Understanding
CLO-2	Understand the application of load flow methods such as Gauss-Seidel method and Newton-Raphson method, and application of symmetrical components in power system.	PLO-1	Cognitive/ Apply
CLO-3	Solve power system networks under different fault and load conditions.	PLO-2	Cognitive/ Evaluating

Section– A (Mid-Term Exam: 30 Marks)

1. **System modeling:** Review of synchronous machine, the effect of synchronous machine excitation, per unit quantities, changing the base of per unit quantities, per unit impedance in single phase transformer and three phase transformer circuits, per unit impedance of three winding transformers, one-line diagram, impedance and reactance diagram, per unit and percentage method of calculations, advantages and disadvantages of per unit computations.
2. **Network calculations:** Node equation, matrix partitioning, node elimination by matrix algebra, bus admittance and impedance matrices, modification of an existing bus impedance matrix, direct determination of a bus impedance matrix.

Section- B (SEE: 50 Marks)
Group A (20 marks)

3. **Load flow solution and control:** Classification of buses, specification of bus voltage-power etc, Gauss-Seidel method and Newton-Raphson method of load flow solutions, some principles of load flow control.
4. **Symmetrical three phase faults:** Short circuit currents and the reactance of synchronous machines, internal voltages of loaded machines under transient conditions, bus impedance matrix in fault calculations, bus impedance matrix equivalent network, percentage reactance and short-circuit MVA, reactor control of short-circuit currents and location of reactors and their advantages and disadvantages.
5. **Symmetrical components:** Symmetrical components of unsymmetrical phasors, sequence impedance and sequence networks, sequence network of unloaded generators, positive and negative sequence networks, zero-sequence networks.

Group B (30 Marks)

6. **Unsymmetrical faults:** Unsymmetrical short-circuits on an unloaded generator, single line-to-ground fault, line-to-line fault, double line-to-ground fault, unsymmetrical faults of power systems, faults through impedance, unsymmetrical open circuits and series impedances.
7. **Power system stability:** The stability problem of power system, swing equation, power-angle equation, equal area criterion of stability.
8. **Multi-machine stability studies:** Classical representation, step-by-step solution of the swing curve, factors affecting stability, techniques for improving stability.

Recommended Reference:

1. Ashfaq Husain, ***Electrical Power Systems***, 5th ed., New Delhi: CBS, 2017.
2. John J. Grainger & Willam D. Stevenson, Jr, ***Elements of Power System Analysis***, 4th ed., Singapore: McGraw-Hill, Inc., 1982.
3. V.K. Mehta & Rohit Mehta, ***Principles of Power System***, 4th ed., India: S. Chand, 2008.
4. Hadi Saadat, ***Power System Analysis***, 2002 ed., USA: McGraw-Hill, Inc., 2002.
5. D P Kothari & I J Nagrath, ***Modern Power System Analysis***, 3rd ed., India: Tata McGraw Hill Edu. Private Ltd., 2009.
6. B.M. Weedy, B.J. Cory, N. Jenkins, J.B. Ekanayake & G. Strbac, ***Electric Power Systems***, 5th ed., UK: John Wiley & Sons Ltd. Publication., 2012.
7. J. D. Glover, M. S. Sarma & T. J. Overbye, ***Power system analysis and design***, 4th ed., India: Thomson learning, 2008.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3520 **Course Title: Power System Analysis Sessional**
Credit Hours: 3 **Contact Hours: 3 per wee**k
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10

marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**

Objectives: In this course students will perform experiments to verify practically the theories and concepts learned in EEE-3519.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Develop practical idea on power flow and voltage regulation considering transmission systems together with generation and various load components.	PLO-1	Cognitive/ Understanding
CLO -2	Capability to make proper connections of power system components to deliver quality power to the end users.	PLO-3	Cognitive/ Creating
CLO -3	Develop writing and communication skill.	PLO-10	Affective/ Responding

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-3601 **Course Title: Communication Theory**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-3501]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Communication Theory' in regards to communication systems at a glance, noise, communication systems ,angle and pulse modulation, digital communication system, satellite communication, microwave link & radar.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO -1	Reflect a basic understanding of analogue and digital communication, Noise, modulation and Multiplexing technique	PLO-1	Cognitive/ Understanding
CLO -2	Apply the understating to Solve the problems of analogue and digital communication problem.	PLO-2	Cognitive / Applying
CLO -3	Use necessary learning skills in different types of analogue and digital communication system design	PLO-3	Cognitive/ Designing.

Section A (Mid Term Exam: 30 Marks)

1. **Communication Systems at a glance:** Basic Principles, fundamental elements, system limitations, message source, bandwidth requirements, transmission media types, and bandwidth and transmission capacity.
2. **Noise:** Source, characteristics of various types of noise and signal to noise ratio, Measure of information, source encoding, error free communication over noisy channel, channel capacity of a continuous system and channel capacity of a discrete memory less system.
3. **Communication systems:** Transmission types-base-band transmission, carrier transmission, AM (information given by the amplitude of the signal), DSB-FC (Double side band - full carrier), Envelope detector DSB-SC (Double side band - suppressed carrier), SSB (single side band), VSB (vestigial side band), spread spectrum, SS7 system. TV-transmitter & Receiver.

Section B (SEE: 50 Marks)

Group A (20 Marks)

4. **Angle modulation**: FM-Frequency modulation, PM – phase modulation, Bandwidth calculation (frequency components), 1% bandwidth, Carson's rule, spectral Analysis, Power in FM & PM signals, Demodulation of FM & PM- Phase locked loop, Time domain. Locked loop with loop gain and static phase error, Super heterodyne receiver
5. **Pulse Modulation:** - sampling theorem, Nyquist criterion, aliasing, instantaneous and natural sampling; pulse amplitude modulation- principle, bandwidth requirements; pulse code modulation (PCM)- quantization principle, quantization noise, non-uniform quantization, signal to quantization error ratio, differential PCM, demodulation of PCM; delta modulation (DM)- principle, adaptive DM; line coding- formats and bandwidths..

Group B (30 Marks)

6. **Digital Communication System:** Digital modulation technique, Amplitude-shift keying- principle, ON-OFF keying, PSK, FSK- continuous & discontinuous phase FSK, minimum shift keying., DPSK & QAM, Quadrature PSK, noise performance, M-array modulation techniques, spectrum of digital signals, Digital carriers system, Sources of error in digital communication systems, Error control coding,
7. **Satellite Communication:** Introduction, Satellite construction, Orbits; Station keeping, Satellite altitude, Transmission path, Noise considerations, Satellite system, Effective isotropic radiated power. Low orbit satellites for mobile communication, Earth station, Satellite link analysis.
8. **Multiplexing technique**- Time-division multiplexing (TDM), FDM, CDM, WDM Multiple Access System- TDMA, FDMA, CDMA- principle, benefits, Time-division multiple-access (TDMA), frequency-division multiple access (FDMA); code-division multiple- access (CDMA) - spread spectrum multiplexing, coding techniques and constraints of CDMA.

Recommended Reference:

1. B.P. lathi, ***Modern Digital and Analog Communication Systems***, 3rd Edition, New York Oxford University Press, 1988.
2. Wayne Tomasi, ***Advanced Electronic Communications Systems***, 6th Edition, 1993
3. Jeffrey S. Beasley, Gary M. Miller, ***Modern Electronic Communication***, 9th Edition, Prentice Hall, 2007.
4. Gorge Kennedy, Bernard Devis, ***Electronic Communication Systems***, 4th Edition, New York McGraw-Hill, 1992.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)

Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3602 **Course Title: Communication Theory Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE).**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-3601. In the second part, students will design simple systems using the principles learned in EEE-3601.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corres-ponding PLOs	Bloom's taxonomy domain/level
CLO -1	Reflect a basic understanding of analogue and digital communication, Noise, modulation and Multiplexing technique	PLO-1	Cognitive/ Understanding
CLO -2	Apply the understating to Solve the problems of analogue and digital communication problem.	PLO-2	Cognitive / Applying
CLO -3	Use necessary skills in different types of analogue and digital communication system design Such as AM, FM, ASK, FSK, PWM systems.	PLO-3	Psychomotor / Manipulation

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-3603 **Course Title Digital Signal Processing I**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-3501]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Digital Signal Processing' in regards to introduction to digital signal processing (DSP), impulse response, solution of difference equation, Z-transform, discrete time harmonic analysis, discrete Fourier transform, digital and IIR filters.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Learn about mathematical representation of analog signals in digital domain, manipulate signals using analytical techniques and familiarize with discrete time signal & systems.	PLO-1,	Cognitive/ Understanding
CLO-2	Interpret the information of discrete time signals by means of frequency domain analysis using mathematical tools such as Z-transform, Discrete Fourier Transform (DFT), Fast Fourier Transform etc.	PLO-4	Cognitive/ Analyzing
CLO-3	Design and realize the responses of discrete-time systems like FIR and IIR Filter etc.	PLO-3	Cognitive/ Creating

Section-A (Mid-term Exam: 30 Marks)

1. **Introduction to Digital Signal Processing:** Digital Signals and Systems, Basic Elements of DSP system, Advantage and Disadvantages of Digital System, Application of DPS, Classification of Signals (Analog, Digital, Continuous time, discrete time, multichannel, multidimensional, deterministic, random signal); Analog to digital conversion (Sampling of analog signal, Alias of frequency, Sampling theorem, Quantization of continuous amplitude signal, Coding of Quantized Samples), Digital to Analog Conversion.
2. **Discrete-Time (DT) Signals and Systems:** Representation of DT signals, Elementary DT signals, Classification of DT Signals (Energy Signals, Power Signals, Periodic-Aperiodic Signals, Symmetric-Antisymmetric Signals), Simple Manipulation of DT signals (Shifting, Folding, down sampling, addition, scaling, multiplication), DT Systems (Input-Output description, Block diagram representation, Classification of DT Systems)
3. **Analysis of Discrete-Time (DT) Linear Time-Invariant (LTI) Systems:** Techniques for the analysis of linear systems, the convolution sum, Recursive and Nonrecursive DT systems, LTI systems characterized by Constant-Coefficient Difference Equations, Correlation of DT Signals (Auto-correlation, Cross-correlation and Application of Correlation).

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Z-Transform:** Definition, Physical Significance, region of convergence, properties of z-transform, transfer function, pole-zeros, inverse z transform, causality and stability, pole-zero cancellations.

5. **Implementation of DT System:** FIR and IIR Systems, Structures for FIR Systems (Direct form and cascade-form structures), Structures of IIR Systems (Direct-form structures, transposed, Cascade-form and parallel-form structures)

Group-B (30-Marks)

6. **Discrete Transformations:** Discrete Fourier series, Discrete-Time-Fourier Transform (DTFT), **Discrete Fourier Transform (DFT)**: definition, properties of DFT, inverse-DFT (IDFT), zero padding, circular convolution, linear convolution by circular convolution. **Fast Fourier Transform (FFT):** computational complexity in DFT, time and frequency decimation, radix-2 FFT Algorithms, Cooley-Tukey decomposition, fast convolution, convolution of a long sequence, overlap and overlap save method
7. **Digital Filter:** Functions and types of digital filter, Advantage of digital filter over analog filter, Filter kernel, Time domain and frequency domain parameters of filter, other filter kernel from low pass filter kernel, FIR Filter: Linear phase filters, mathematical structures, specifications, design using window, optimum and frequency sampling methods.
8. **IIR Filter and Applications of DSP: IIR Filter**: Mathematical structure, design using impulse invariance and bilinear transform, Butterworth, Chebychev, Inverse Chebychev, Bessel and elliptic filters, finite precision effects in implementing digital filters. **Application of DPS**: Application of DSP in speech processing, medical imaging and radar.

Recommended Reference:

1. J. G. Proakis and Dimitris. G. Manolakis, ***Digital Signal Processing: Principles, Algorithms, and Applications***, 4th Edition, USA: Pearson Education, 2014.
2. Steven W. Smith, ***The Scientist and Engineer's Guide to Digital Signal Processing***, 2nd Edition, USA: California Technical Publishing, San Diego,1999.
3. Emmanuel C Ifeachor and Barrie W Jervis, ***Digital Signal Processing: A practical approach***, 2nd Edition, USA: Pearson Education, 2009.
4. Li Tan and Jean Jiang, ***Digital Signal Processing: Fundamentals and Applications***, 2nd Edition, UK: Academic Press, 2013.
5. Sanjit K. Mitra, ***Digital Signal Processing: A computer-based Approach***, 4th Edition, India: McGraw Hill Education (India) Private Limited, 2013.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course code: EEE-3604 **Course Title: Digital Signal Processing I Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-3603. In the second part, students will design simple systems using the principles learned in EEE-3603.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Learning about mathematical representation of analog signals in digital domain, manipulate signals using analytical techniques and familiarize with discrete time signal & systems.	PLO-1	Cognitive/ Understanding
CLO-2	Developing ability to manipulate and analysis of discrete-time (DT) signal by modern software tools.	PLO-3	Cognitive/ Analyzing
CLO-3	Developing skill to design (using Simulation tool) and implement of discrete time (DT) system.	PLO-5	Psychomotor/ Precision
CLO-4	To demonstrate the skill to write experimental report individually	PLO-8	Affective/ Responding

Recommended Reference:

1. J. G. Proakis and Dimitris. G. Manolakis, ***Digital Signal Processing: Principles, Algorithms, and Applications***, 4th Edition, USA: Pearson Education, 2014.
2. Steven W. Smith, ***The Scientist and Engineer's Guide to Digital Signal Processing***, 2nd Edition, USA: California Technical Publishing, San Diego,1999.
3. Emmanuel C Ifeachor and Barrie W Jervis , ***Digital Signal Processing: A practical approach***, 2nd Edition, USA: Pearson Education, 2009.
4. Li Tan and Jean Jiang, ***Digital Signal Processing: Fundamentals and Applications***, 2nd Edition, UK: Academic Press, 2013.
5. Sanjit K. Mitra, ***Digital Signal Processing: A computer-based Approach***, 4th Edition, India: McGraw Hill Education (India) Private Limited, 2013.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-3607 **Course Title: Solid State Devices**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Prerequisite: EEE-3515]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Solid State Devices in regards to energy bands in solids, carrier transport processes and excess carrier, PN junction, forward and reverse bias, bipolar junction and junction field effect transistor, metal –semiconductor, FET and MOS FET

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	**Understand** the physics of semiconductor devices regarding carriers, the energy band and their behavior in solid.	PLO-1	Cognitive/ Understanding
CLO-2	**Develop** the designing skill from the idea of carrier transportation in solid and their behavior in various junctions.	PLO-3	Cognitive/ Analyzing
CLO-3	**Understanding the working** principle of different devices like FET, BJT, Solar Cell and gain necessary knowledge for **device design**, fabrication and characterization.	PLO-4	Cognitive/ Analyzing

Section-A (Mid-term Exam: 30 Marks)

1. **Energy Bands in Solids and Carrier Concentrations**: Energy bands, Metals, Semiconductor and Insulators, Electrons and Holes, Effective mass, intrinsic and Extrinsic Semiconductors, The Fermi Level, Electron and Hole concentrations of Equilibrium.
2. **Carrier transport processes and excess carriers**: Conductivity and mobility, Drift and Resistance, The Hall-Effect, Diffusion processes, Diffusion and Drift Carriers, Built -in -field, Diffusion and Recombination, Einstein relations, The continuity and diffusion equations for holes and electrons.;.
3. **PN Junction: Fabrication of PN Junction**: The Contact Potential, Equilibrium Conditions, Equilibrium Fermi Level, Space charge at a junction.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Forward and reverse bias**: Carrier injection, minority and majority carrier currents, Reverse Bias, Zener and Avalanche Breakdown, Time variation of stored charge, Capacitance of PN Junction.
5. **Bipolar Junction Transistor**: Basic Principle of pnp and npn transistors, emitter efficiency, base transport factor and current gain, Solution of the diffusion equation in the base, Terminal currents, The coupled diode model, Ebers-Moll equations, frequency limitation of transistors.

Group-B (30-Marks)

6. **FET**: Introduction, qualitative theory of operation, Pinch-off and Saturation, Gate Control, Current-Voltage Characteristics, The GaAs MESFET, HEMET, Energy band diagram of metal semiconductor junction, rectifying and ohmic contact.

7. **MOS FET**: The Ideal MOS Capacitor, MOS Output and Transfer Characteristics, Short Channel I-V Characteristics, Threshold Voltage, Qualitative theory of MOSFET operation, Equivalent Circuit of a MOSFET. MOSFET Scaling and Hot Electron Effects.
8. **Optical Devices**: Optical Absorption, Solar cell- The PN junction solar cell, conversion efficiency and solar concentration, the hetrojunction solar cell, amorphous silicon solar cells, Light Emitting diode, materials for light LED, Laser diodes, Materials for laser diodes.

Recommended Reference:

1. Ben G. Streetman & Sanjay Banerjee, ***Solid State Electronic Devices***, 6th ed., USA: Pearson Prentice Hall, 2006.
2. S O Kasap, ***Principles of electrical engineering materials and devices***, 3rd ed., India: Tata McGraw-Hill, 2007.
3. Thomas L. Floyd, ***Electronic Devices***, 4th ed., India: Pearson Education, Inc., 2006.
4. H.P Myers., ***Introduction to Solid State Physics***, 3rd ed., USA: Taylors and Francis Ltd., 2015.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-3608 **Course Title: Research Methodology & Seminar**
Credit Hours: 1 **Contact Hours: 2 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE)** and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objective: The aim of the course is

a) To understand the concept of various research.
b) To get the ability for preparing various research design, research proposal, scientific journal articles.
c) To be familiar with plagiarism and international presentations.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLos	Bloom's taxonomy domain/level
CLO-1	**Explore** themselves for higher studies with self-motivation for **lifelong learning.**	PLO-12	Affective/ Valuing
CLO-2	**Demonstrate basic proficiency** on **writing** research proposal, research article and **presenting** an article in a formal gathering.	PLO-10	Affective/ Responding
CLO-3	**Commit** to professional ethics, responsibilities and the norms of the engineering practice.	PLO-8	Affective/ Valuing

1. Introduction: Research motivation, research objective, contribution, methodology and research outlines
2. Literature Reviews: Element of research, reviewing of related works, choosing of methodology, comparative method, proposed method
3. Design of Research Methodology: Designing of proposed method

4. Concept of Measurement: Data Collection, data analyzing, compression and discussion
5. Discussion
6. Conclusion
7. Scientific Paper Writing: Abstract, introduction, materials and methods, results, discussion, table, figures, citations, references, format, conference paper, journal paper
8. Seminar and presentation

Recommended Reference:

1. Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams, The Craft of Research, 3rd ed, University of Chicago Press, 2008
2. C. R. Kothari, Research Methodology Methods and Techniques, 2nd ed, New Age Int. Pub, 2004.
3. Jerrold H. Zar., ***Biostatistical Analysis***, Pearson education.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-3612 **Course Title: Electrical Service Design Sessional**
Credit Hours: 1 **Contact Hours: 2 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will learn about domestic and industrial electrical services. Wiring system design, drafting, and estimation. Design for illumination and lighting. Electrical installations system design: substation, BBT and protection, air-conditioning, heating and lifts.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	**Analyze** electrical power demand and provide **plan** for electrical issues in a building.	**PLO-11**	Cognitive/ Applying
CLO-2	Design system components for different electrical home safety issues.	PLO-3	Cognitive/ Creating
CLO-3	Apply appropriate techniques and tools to design electrical services for buildings .	PLO-5	Psychomotor/ Manipulation
CLO-4	Function effectively **as an individual** to test and collect different experimental data during the lab classes.	PLO-9	Affective/ Organization
CLO-5	Recognize the need for life-long learning of electrical services in the broadest context of technological change.	PLO-12	Cognitive/ Understanding

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-3621 **Course Title: Engineering Electromagnetism**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Pre requisite: EEE-1201]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will get comprehensive idea about electromagnetism, Maxwell equation, static electric fields, magneto statics, time varying electric fields, wave guide, transmission line, behavior of materials in space.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Learn some fundamental laws and theories of electromagnetic fields and waves with applications.	PLO-1	Cognitive/ Understandi

			ng
CLO -2	Understand the interactions of electromagnetic (EM) fields and waves with various materials and media.	PLO-1	Cognitive/ Understanding.
CLO -3	Apply mathematical foundations to solve various electromagnetic fundamental issues.	PLO-2	Cognitive/ Apply

Section-A (Mid-term Exam: 30 Marks)

1. **Electrostatic Fields**: Coulomb‟s Law, Gauss‟s Law- Maxwell‟s Equation, Application of Gauss‟s Law, Electric Potential, An Electric Dipole & Flux Lines, Energy Density in Electrostatic Fields.
2. **Electric Fields in Materials Space**: Polarization in Dielectrics, Dielectric Constant and strength, Linear & Isotropic and Homogeneous Dielectrics, Continuity Equation and Relaxation Time, Boundary Conditions.
3. **Electrostatic Boundary Value Problems**: Poisson‟s and Laplace‟s Equations, Uniqueness Theorem,
   General Procedures for solving Poisson‟s or Laplace‟s Equation, Method of Images.

Section-B (SEE:50 Marks)

Group-A (20-Marks)

4. **Static Magnetic Field**: Magnetic flux density, Biot-Savarts law, Ampere and Faraday; magnetic field intensity and relative permeability, Displacement current, Maxwell's equations.
5. **Propagation of Electromagnetic Waves**: Wave equations, Plane Wave concept, Plane electromagnetic
   waves in Free space, Conducting, Dielectric and Ionized media, Poynting vector.

Group-B (30 Marks)

6. **Reflection and Refraction of Electromagnetic Waves:** Boundary conditions, The laws of reflection and Snell's law of refraction, Fresnel's equations, The Brewster angle, Total reflection, Skin effect, Phase and group velocities.
7. **Transmission Lines:** Transmission line equations and parameters, Input Impedance, Standing Wave Ratio, Smith Chart, Impedance matching, Distortion less line.
8. **Propagation of Electromagnetic wave in the guided media:** Rectangular wave guides, TM and TE modes, Wave Propagation in the Guide, Cut-off wave length of a rectangular waveguide, Relation between cut-off wavelength, guide wavelength and free space wavelength, selected topics of current research in Electromagnetic.

Recommended Reference:

1. Matthew N. O. Sadiku, ***Elements of Electromagnetics***, 5th Edition, Oxford University Press, 2010.
2. W.H Hayt, J.A.Buck, ***Engineering Electromagnetics***, 6th Edition, McGraw-Hill, 2001.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05

x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4701 **Course Title: Control System I**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite: EEE-3501]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about „Control System" in regard to linear system models, system block diagrams and signal flow graphs, stability, time response, steady-state error, dynamic compensation, root locus analysis and design, frequency response analysis and design.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corres-ponding PLos	Bloom's taxonomy domain/level
CLO -1	Learn about basic control system engineering to model, analysis, and design a system	PLO-1	Cognitive/ Understanding .
CLO -2	Demonstrate basic proficiency in solving basic electrical and mechanical control system modeling	PLO-2	Cognitive/ Evaluating
CLO -3	Design basic controllers for application-specific troubleshooting, identify problems and provide solutions for society's sustainable development.	PLO-3	Cognitive/ Creating

Section-A (Mid-term Exam: 30 Marks)

1. **Linear System Models**: Introduction to control systems, Design process of feedback control system, Mathematical Models of Systems: transfer function and state-space models, conversion between transfer function and state-space models, Linearization.
2. **Block Diagrams and Signal Flow Graphs**: Block diagrams of systems block diagram reduction, signal flow graphs of systems, Mason's formula, Signal flow graphs of state equations. Effect of adding poles and zeros
3. **Stability**: Bounded-input bounded-output (BIBO) stability, Routh-Hurwitz stability criterion, Stability in State Space

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Time Response**: Pole-zero plots, first and second order transient responses, higher order system approximation, Laplace transform and time domain solution of State equations.
5. **Steady-state Error**: Steady-state Error for feedback systems, System Type, Sensitivity, and Steady-stat error for Systems in State Space.

Group-B (30-Marks)

6. **Root Locus Analysis and Design**: Definition of root locus, Properties of root locus, sketching of root locus plots. Effect of open-loop zeros and poles. Root locus design concepts the root locus method, rules for root locus plotting and construction of root locus, root locus design.
7. **Dynamic Compensation**: Feedback compensation, lead-lag compensation.
8. **Frequency Response Analysis, Design and Selected Topics**: Frequency response, polar plots, bode plots, gain and phase margins, compensator design in the frequency domain, Digital Control System, Selected topics (such as PLC, SCADA, and DCS).

Recommended Reference:

1. Norman S. Nise, ***Control System Engineering***, 7th Ed., Wiley, 2015.
2. Katsuhiko Ogata, ***Modern Control Engineering***, 5th Ed., Prentice Hall, 2010.
3. Stuart A. Boyer, ***SCADA: supervisory control and data acquisition, International Society of Automation***, 2009.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4702 **Course Title: Control System I Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4701. In the second part, students will design simple systems using the principles learn in EEE-4701.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLos	Bloom's taxonomy domain/level
CLO-1	Get familiar with the control system tools of MATLAB.	PLO-1	Cognitive/ Understanding.
CLO-2	Model engineering system and analyze the system response using modern tools.	PLO-5	Cognitive/ Analyzing;
CLO-3	Design and tuning of controller for engineering application.	PLO-3	Cognitive/ Designing

MATLAB Software

MATLAB is a popular computation and visualization software package developed by the MathWorks, Inc. In this course, MATLAB will be used together with its Control System Toolbox. The best way to learn MATLAB in the control context is through the web-based Control Tutorials for MATLAB (*http://www.engin.umich.edu/class/ctms/*). The tutorials combine explanatory text with sample MATLAB commands and illustrative plots and graphics. The outline of the tutorials closely follows that of most undergraduate control textbooks and should be a useful on-line tool for all control stream courses.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva.

Course Code: EEE-4804 **Course Title: Industrial Attachment**
Credit Hours: 1 **Contact Hours: 2 per Week**

Marks distribution for the courses: There will be 100 marks for the course**.** These 100 marks will be distributed as follows:

Assessment	Marks
Quiz	30%
Viva	20%
Report Writing	20%
Presentation	30%
Total	100%

Objectives: The aim of the course is to prepare students for professional environment in the field of Electrical & Electronic & Engineering.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO1	**Apply** knowledge of Mathematics, Science, professional standards and Engineering Fundamentals.	PLO-1	Cognitive/ Applying
CLO2	**Apply** appropriate **techniques and tools** to identify and solve engineering problems.	PLO-5	Psychomotor/ Manipulation
CLO3	Demonstrate the ability to **work as an individual and in group** with the capacity to be a leader or manager as well as an effective team member.	PLO-9	Affective/ Organization
CLO4	Effectively demonstrate skills in **communication** through professional report writing and oral presentation.	PLO-10	Affective/ Responding
CLO5	Demonstrate the practical skill in professional environment through professional standard and **lifelong learning.**	PLO-12	Cognitive/ Applying

Industrial training must be related to practical knowledge on combined technical field of Electrical and Electronic Engineering (Major parts), Instrumentation and Control Engineering (Major Parts), Mechanical Engineering (Minor parts), and Operation, Safety and Process Technology.

Course Code: EEE-4822 **Course Title: General Viva-Voce**
Credit Hours: 1 **Contact Hours: 1 per Week**

Objective: The aim of the course is to give an overview on electrical engineering, make them motivated for analytical study to prepare themselves for higher study and life-long learning. To prepare students to face a formal viva.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Explain on any diverse topics of electrical engineering	PLO-01	Cognitive/ Understanding
CLO-2	Demonstrate basic proficiency on discussing on a topic in a formal gathering	PLO-10	Affective/Valuing
CLO-3	Develop the analytical ability of study being motivated for higher studies and to continue for life-long learning	PLO-12	Cognitive/ Applying

Course Code: EEE-4860 **Course Title: Project / Thesis**
Credit Hours: **3**

Objective: The aim of the course is to develop the ability of investigation and problem solving skills of students in the field of Electrical & Electronic & Engineering.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Students will be able to **apply** their knowledge of basic science and engineering fundamentals throughout the course and that they will demonstrate an in-depth technical competence in at least one discipline related to electrical and electronic engineering.	PLO-1	Cognitive/ Applying
CLO-2	They will demonstrate the ability to find out the state-of-the-art problems as well as the solutions with appropriate design of professional standard which will develop the capacity to undertake **lifelong learning**.	PLO-12	Cognitive/ Creating.
CLO-3	Be able to present the project/thesis, outlining the approach and expected results using good **oral and written presentation skill**	PLO-10	Affective/ Responding
CLO-4	Student will learn to function effectively as an individual and also in a **group** as a group member	PLO-9	Affective/ Organization
CLO-5	**Demonstrate** professional ethics, responsibilities and the norms of the engineering practice.	**PLO-8**	Affective/ Valuing
CLO-6	**Conduct investigations** of engineering problems, considering design of experiments, analysis, and interpretation of data and synthesis of information to provide valid conclusions.	**PLO-4**	Cognitive/ Analyzing

Assessment Pattern:

Supervisor (40)			DEFENSE BOARD (60)						
Know-ledge	Indiv. & Team Work	Life Long Learning	Report (20)				Final Defense (40)		
			Lit. Review	Method	Fig./Tab/ Organization	Plagia-rism	Present-ation	Know.	Invest-igate
15	15	10	5	5	5	5	15	15	10
CLO1	CLO 4	CLO-2	CLO3	CLO6	CLO5	CLO5	CLO3	CLO1	CLO6

E. EEE Elective Courses

Power Systems Engineering

Course Code: EEE-4705 **Course Title: Power Electronics**
Credit Hours: 3 **Contact Hours: 3 contact hours per week**
[Prerequisite course: EEE-2411]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Power Electronics' in regards to power semiconductor switches and triggering devices, uncontrolled, single-phase controlled and three-phase controlled rectifiers, 2 DC-DC converters, pulse-width-modulated and resonant pulse inverters, AC voltage controllers**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of power electronic devices, its application and power control mechanism.	PLO-01	Cognitive/ Understanding
CLO-2	Solve different problems related to converters and controllers.	PLO-02	Cognitive/ Evaluating
CLO-3	Design and development of different converters and controllers.	PLO-03	Cognitive/ Designing

Section-A (Mid-term Exam: 30 Marks)

1. **Power Semiconductor Switches and Triggering Devices:** BJT, MOSFET, SCR, IGBT, GTO, TRIAC, UJT and DIAC
2. **Uncontrolled Rectifiers:** Single-Phase Half-Wave rectifier, Performance parameters, Single-Phase Full-Wave Rectifiers with R load and RL load, Three-Phase Full-Wave Rectifiers with R load and RL load.
3. **Single-Phase Controlled Rectifiers:** Thyristor Characteristics and Applications, Two Transistor model of Thyristor, Thyristor Turn-On and Turn-Off, Thyristor types. Phase Controlled Converter operation, Single-Phase Full Converters with R Load and RL load, Single-Phase Dual Converters and Semiconverters**.**

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Three-Phase Controlled Rectifiers:** Three-Phase Half-wave Converters, Three-Phase Full Converters with R load and RL load, Three-Phase Dual Converters and Semiconverters, Power Factor Improvements, Twelve-Pulse Converters.
5. **2 DC-DC Converters:** Generation of Duty Cycle, Step-Down Converter, Step-Up Converter, Converter Classification, Switching-Mode Regulators: Buck regulators, Boost Regulators. Buck-Boost Regulators, Cuk Regulators.

Group-B (30-Marks)

6. **Inverters**: Principle of Operation, Single-Phase Bridge Inverters, Three-Phase Inverters: 180-Degree Conduction, 120-Degree Conduction, Resonant Pulse Inverters: Series and Parallel Resonant Inverters,
7. **AC voltage Controllers**: Principle of On-Off Control, Principle of Phase Control, Single Phase Controllers with Resistive and Inductive load, Three-Phase Full-Wave Controllers, Three Phase Full-Wave Controllers, Three Phase Bidirectional Delta-Connected Controllers, Single-Phase and Three-Phase Cycloconverters.
8. **AC and DC Drives**: Basic characteristics of DC motors, Single phase drives, Three phase drives, Chopper drives, Induction Motor Drives, Synchronous motor drives.

Recommended Reference:

1. Muhammad H.Rashid, ***Power Electronics, Circuits, Devices and Applications***, 3rd ed., India, Pearson Education, Inc., 2004.
2. Thomas L.Floyd, ***Electronic Devices***, 9th ed., New Jersey, United States of America, Prentice Hall, 2012.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4706 **Course Title: Power Electronics Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4705. In the second part, students will design simple systems using the principles learned in EEE-4705

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Correspondi ng PLOs	Bloom's taxonomy domain/level

CL O-1	Apply the knowledge of power electronic devices and power control mechanism.	PLO-1	Cognitive/ Apply
CL O-2	Design and development of different Power Electronic Circuits	PLO-3	Cognitive/ Designing
CL O-3	Develop communication skill.	PLO-10	Affective/ Responding

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4707 **Course Title: Power Plant Engineering**
Credit Hours: 3 **Contact Hours: 3 per week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Power Plant Engineering' in regards basic principle of power plant, steam turbine power plant, gas turbine power plant, hydroelectric power plant, nuclear power plant, magneto hydro dynamic generator, power plant economics and economic problems.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CL O-1	Students will be able to understand the operating principles and economics of different power plants.	PLO-01	Cognitive/ Understanding
CL O-2	They will learn different possible engineering solutions for power plant in societal and environmental contexts.	PLO-07	Cognitive/ Remembering
CL O-3	They will be able to apply mathematical foundations to solve various power plants and power plant economics related issues.	PLO-02	Cognitive/ Apply

Section-A (Mid-term Exam: 30 Marks)

1. **Introduction:** Importance of Electrical Energy, Basic principle of power plant, Brief introduction of various Energy sources, Present situation of power plants in Bangladesh, Power station design, **Steam Turbine Power Plant:** Operating principle, Site selection, Advantages & disadvantages.

2. **Steam Turbine Power Plant:** Pulverized Coal, Main Accessories, Automatic boiler control, Boilers: Water tube and Fire tube boilers, Boiler furnace, Types of Condensers: Surface and Jet Condensers, Super Heater, Economizer, Water treatment Plant, Steam Engine VS Steam turbine.
3. **Gas Turbine Power Plant (GTPP):** Operating principle, Classification, Constituents of GTPP, Gas turbine cycles, Compressors, combined cycle gas turbine power plant, Advantages & disadvantages of GTPP, Steam turbine VS Gas turbine, Starting of GTPP. **Diesel Power Station:** basic operation, advantage and disadvantage.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Hydro Electric Power Plant (HEPP):** Operating principle, Constituents of HEPP, Site selection, Types of HEPP, Water hammer & cavitations, Advantages and disadvantages, Application, Performance of water turbine, Turbine governing, Choice of water turbine.
5. **Nuclear Power Plant (NPP):** Basic idea of nuclear fission and chain reaction, Operating principle of NPP, Details of plant equipments, Fuel of NPP, Types of nuclear reactor, Uranium enrichment, Nuclear waste management, Site selection, Advantages and Disadvantages.

Group-B (30-Marks)

6. **Magneto Hydro Dynamic (MHD) Generator:** Operating principle, Types of MHD generator, Advantages and disadvantages, Terms and definitions, Combination of MHD power plant and steam power plant. **Power station performance:** Connected load, demand factor, load factor, capacity factor, utilization factor, diversity factor etc. and impact of different factors over the cost analysis of power generation and utilization.
7. **Power Plant performance and operating characteristics:** efficiency, heat rate, Input-output curve, Heat rate curve, Incremental rate curve. Generation scheduling, Variable load problems, load curve and load duration curve, Base load and peak load plants, method of meeting the load, interconnected grid system.
8. **Power Plant Economics:** Economic load sharing, Economics of power generation, cost of electrical energy: Analysis of fixed cost and running/operating cost, Choice of power station. **Energy Tariffs:** description, types and tariff in Bangladesh. **Private generation:** industrial co-generation, capacity generation; Power Plant Instruments.

Recommended Reference:

1. G. R. Nagpal, ***Power Plant Engineering***, 15th ed., India: Khanna Publishers, 2006.
2. V. K. Mehta & Rohit Mehta, ***Principles of Power System***, 2006 ed., India: S. Chand, 2006.
3. William A. Vopat & Bernhardt G.A. Skrotzki, ***Power System Engineering and Economy***, 2nd ed., USA: McGraw Hill, 1960.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode				

	must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Coode: EEE-4801 **Course Title: Power System Protection**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3519 Power System Analysis]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Power System Protection' in regards to switchgear, fuse & relay, circuit breakers and breaker ratings; transformer, generator, motor, bus and transmission line protection; static, digital and numerical relay.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of switchgear, fuse, protective relay, static and numerical relay, circuit breaker, transformer and alternator protection, bus bar and line protection etc.	PLO-01	Cognitive/ Understanding
CLO-2	Develop the idea regarding the different types of protection system design	PLO-02	Cognitive/ Understanding
CLO-3	Demonstrate basic proficiency in building protective system	PLO-03	Psychomotor/Precision

Section-A
(Mid-term Exam:30 Marks)

1. Introduction to Switchgear: Purpose of power system protection, Introduction to Switchgear, circuit interruption and protection. Criteria for detecting faults and requirements of protective devices, Terminologies and general characteristics of relays and circuit breaker, Different types of protective devices used in Switchgear.

2 Fuse: Fuse, Characteristics of fuse, terms related to fuse, types of fuse, current carrying capacity of fuse.

3. Protective Relay: Fundamental requirements, basic relay, terms related to relay, over-current, differential, directional, distance relay, types of protection.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. Circuit breakers: Circuit breaker, Arc Phenomenon, arc extinction method, term related to circuit breaker, Air blast, Oil, SF6, vacuum circuit breaker, switchgear components, problems of circuit interruption, resistance switching, circuit breaker ratings.

5. Transformer protection: Different types of faults in Transformer, different types of protection scheme in transformer, Buocholz Relay etc. Integrated HV transmission line protection, Combined Transformer and Bus bar protection.

Group-B (30-Marks)

6. Generator and Motor protection: Introduction, Different types of faults in Generator and motor, different types of protection scheme.

7. **Bus and Transmission line protection**: Bus bar arrangement, Pilot-wire and carrier current protection, different types of Bus and Transmission line protection scheme, Over voltage protection, lightning and lightning arresters, Grounding

8. Static and digital/numerical relay: definition, features, Operation, application, Block diagram and types, Microcontroller and Microprocessor based protection.

Recommended Reference:

1. V.K. Mehta, ***Principles of Power System***, Revised Edition, India, S Chand.
2. J. Lewis Blackburn, ***Protective Relaying: Principles and Applications***, 4th Edition, US, Marcel Dekker Incorporated, 1987.
3. Sunil S. Rao, ***Switchgear and Protection***, Khanna Publishers, 1992.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4802 **Course Title: Power System Protection Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4801.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be	Correspondi ng PLOs	Bloom's taxonomy

	able to		domain/level
CLO-1	Understand about switchgear, fuse, protective relay, circuit breaker, and Transformer and alternator protection.	PLO-01	Cognitive/ Understanding
CLO-2	Generate the idea regarding safety issues using the different types of protection system design.	PLO-06	Cognitive/ Understanding
CLO-3	Demonstrate basic proficiency in building protective system.	PLO-03	Psychomotor/ Manipulation

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Coode: EEE-4805 **Course Title: Power System Operation and Control**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3519]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Power System Operation and Control' in regards to evaluation of small network, SCADA, power market, economic operation of power generation, control of voltage and frequency, conventional and competitive electricity market and Power system control.

Section-A (Mid-term Exam: 30 Marks)

1. **Principles of power system operation**: State evaluation of small network, Phasor diagram Method, summation of losses method, two port equation.
2. **State estimation**: Underlying assumption, solution method, SCADA,
3. **Power market**: conventional and competitive environment. Overview of power system operation

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Economic Operation**: Economic Load Dispatch (ELD) with the objective being cost minimization as well as environmental emission minimization.
5. **Unit Commitment** with the objective being cost minimization as well as environmental emission minimization.

Group-B (30-Marks)

6. **Overview of optimum power** flow and its application. Static security analysis, dynamic security analysis.

7. **Power system control:** Control of frequency, control of active power generation, spinning reserve.
8. **Automatic generation** control and control of reactive power and Voltage

Recommended Reference:

1. Leonard L. Grigsby, ***Power System Stability and Control***, CRC Press, 2007.
2. Wood, B.F. Wollenberg, ***Power Generation Operation and Control,*** Second Edition, John Wiley and Sons, 1996.
3. P. Kundur, ***Power System Engineering Series***, MacGraw-Hill Inc., 1994.
4. J.D. Glover and M.S. Sarma, ***Power System Analysis and Design***, Third Edition, Brooks/Cole, 2002.
5. M. Shahidehpour, H. Yamin, Z. Li, ***Market Operations in Electric Power Systems***, John Wiley and Sons, 2002.
6. Stuart A. Boyer, ***SCADA: supervisory control and data acquisition, International Society of Automation***, 2009.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4807 **Course Title: High Voltage Engineering**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3519]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'High Voltage Engineering' in regards to high voltage generators, transformer, insulators, high voltage measuring, testing and switching.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of breakdown criterion in different insulating materials (gases, liquids, and solids) which are used in power system equipment's, generation method of high voltages both AC & DC, insulation coordination, measurement of high voltage techniques etc.	PLO-01	Cognitive/ Understanding
CLO-2	Demonstrate the problem solving of different types of high voltages engineering circuits.	PLO-02	Cognitive/ Applying
CLO-3	Design the mathematical model for lightning phenomena and corresponding high voltage engineering circuits.	PLO-03	Cognitive/ Designing

Section –A (Mid-term Exam: 30 Marks)

1. **High voltage dc**: Rectifier circuits, voltage multipliers, Van-de-Graaf and electrostatic generators.
2. **High voltage ac**: Cascaded transformers and Tesla coils.
3. **Impulse voltage**: Shapes, mathematical analysis, codes and standards,

Section- B (SEE: 50 Marks)

Group- A (20-Marks)

4. **Single and multi-stage impulse generators**, tripping and control of impulse generators.
5. **Breakdown in gas**, liquid and solid dielectric materials.

Group-B (30 Marks)

6. **Corona;** High voltage measurements and testing.
7. **Insulation:** Over-voltage phenomenon and insulation coordination.
8. **Lightning** and switching surges, basic insulation level, surge diverters and arresters.

Recommended Reference:

1. E. Kuffel & W.S. Zaengl & J. Kuffel, ***High voltage engineering Fundamentals***, 2nd ed., UK: Butterworth-Heinemann press, 2000.
2. C. L. Wadhwa, ***High voltage engineering***, 2nd ed., New Delhi: New age, 2007.
3. M. S. Naidu & V. Kamaraju, ***High voltage engineering***, 3rd ed., New Delhi: McGraw-Hill, 2004.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	

Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Electronic Engineering

Course Code: EEE-4753 **Course Title: VLSI I**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3607]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about VLSI design technique and modeling as well as CMOS circuit design, characteristics and applications.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of IC design and fabrication technique.	PLO-01	Cognitive/ Understanding
CLO-2	Solve different problems related to MOS Device, CMOS logic circuits and Fabrication.	PLO-02	Cognitive/ Applying
CLO-3	Design and development of different CMOS logic circuits.	PLO-03	Cognitive/ Designing

Section A (Mid Term: 30 Marks)

1. Introduction: Integrated Circuits trends, choice of technology, design approaches, the design process, Mooer`s law, VLSI Design style, overviews of VLSI Design Tools.

2. Introduction to MOS Devices and Basic Circuits: MOS device structure, MOS device mode of operation (cut off, saturation, linear, accumulation, depletion), threshold voltage, body effect, NMOS I-V equations and characteristics, PMOSI-V equations and characteristics, Principle of inverter, NMOS Inverter with resister load, NMOS Inverter with NMOS Enhancement Transistor load, NMOS Inverter with NMOS Depletion Transistor load.

3.CMOS Inverter Design: The CMOS inverter, transfer characteristics, noise merging, Resistance, capacitance, rise and fall times, delay, switching characteristics, gate transistor sizing and power consumption. [4 lecture]

Section-B (SEE: 50 Marks)
Group-A (20-Marks

4. CMOS Fabrication: Introduction to Fabrication, Basic Fabrication Steps, Lithograpy, Diffusion and Ion Implementation, Epitaxy, Etching, Wafer cleaning, Metallization and Passivation, Steps for Fabricating a NMOS Transistor, n-Well CMOS Technology, p-Well CMOS Technology.
5. Design Rule: CMOS Process Layers, Intra-Layer Design Rules (λ), Inter-Layer Design Rules - Transistor Layout (λ), Inter-Layer Design Rules - Contact and Via (λ), Select Layer (λ), CMOS Inverter Layout.

Group B (30 Marks)

6. **MOS Logical Circuit Design:** Combinational and sequential logic, Random logic, Static and Dynamic logic gates, N-MOS Transistor series/ Parallel combination, P-MOS Transistor series/ Parallel combination, DC analysis (NAND, NOR, X-OR, X-NOR), Series Parallel Equivalent Circuits, Pass transistor and Transmission gates
7. Overview of Implementation Approaches: Full Custom and Semi-Custom Design, Cell based design, Array based design, Standard cells design, Programmable Logic Array, FPGA, Stick Diagram, Scaling, Effect of Scaling in Circuit Performance.
8. **Introduction of HDLs and VHDL:** HDLs applications, Range of use, VHDL - overview: VHDL - History, VHDL - Application Field, VHDL benefits, VHDL model components, VHDL architecture bodies, Structural description, Behavioral description.

Recommended Reference:

1. Linda E.M Brackenbury, ***Design of VLSI Systems- A Practical Introduction***, 1st ed., London,UK, Macmillan Education Ltd.1987
2. Neil H.E.Weste, David Money Harris, ***CMOS VLSI Design- A Circuits And Systems Perspective***, 4th ed. United States of America, Pearson Education Inc., 2011
3. Adel S. Sedra , Kenneth C.Smith, ***Micro Electronic Circuits***, 5th ed. Newyork, USA, Oxford University Press, 2004
4. Douglas A. Pucknell, Kamran Eshraghian, ***Basic VLSI Design***, 3rd ed.,India , PHI

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4754 **Course Title: VLSI I Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4753. In the second part, students will design simple systems using the principles learned in EEE-4753.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Apply the knowledge of MOS devices and CMOS logic circuits.	PLO-01	Cognitive/ Understanding
CLO-2	Simulate and Layout Design of different CMOS logical circuits using Cadence VLSI Design tools.	PLO-05	Psychomotor / Precision
CLO-3	Develop communication skill.	PLO-10	Affective/Responding

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4713 Course Code: Compound Semiconductor and Hetero-junction Devices
Credit Hours: 3 Contact Hours: 3 per week
[Prerequisite course: EEE-2411]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Compound Semiconductor and hetro-junction devices' in regards to the structure of compound semiconductors and characteristics of hetero-junction dvices and their preparation.

Section A (Mid Term: 30 Marks)

1. **Compound semiconductor**: Zinc-blend crystal structures, growth techniques, alloys, band gap, and density of carriers in intrinsic and doped compound semiconductors.
2. **Hetero-Junctions**: Band alignment, band offset, Anderson's rule,
3. **Single and double sided hetero- junctions**,

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Quantum wells and quantization effects**, lattice mismatch and strain and common hetero-structure material systems.
5. **Hetero-junction diode:** Band banding, carrier transport and I-V characteristics.

Group B (30 Marks)

6. **Hetero-junction field effect transistor**: Structure and principle, band structure, carrier transport and I-V characteristics.
7. **Hetero-structure bipolar transistor (HBT**): Structure and operating principle, quasi-static analysis,
8. **Different Models**: Extended Gummel-Poon model, Ebers-Moll model, secondary effects and band diagram of a graded alloy base HBT.

Recommended Reference:

1. Donald A. Neamen, ***Semiconductor Physics and Devices***, 3rd Ed., McGraw Hill.
2. M.N. Horenstein, ***Solid State Electronic Device***, 3rd Ed., McGraw Hill.
3. S. M. Sze, ***Semiconductor Devices Physics and Technology***, John Wiley & Sons.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4809 **Course Title: VLSI II**

Credit Hours: 3 **Contact Hours: 3 per week**

[Prerequisite course: EEE-4753]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course students learn about Integrated VLSI fabrication process, design layout, floor planning and routing**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of IC design and fabrication technique.	PLO-01	Cognitive/ Understanding
CLO-2	Solve different problems related to MOS Device, CMOS logic circuits and Fabrication.	PLO-02	Cognitive/ Applying
CLO-3	Design and development of different CMOS logic circuits.	PLO-03	Cognitive/ Designing

Section A (Mid Term: 30 Marks)

1.**VLSI MOS system design layout ex**traction: Fabrication Process, Wires and Bias, Design rules and tools

2.VLSI MOS system design layout verification,

3. Full and semi-full custom design styles and logical and physical positioning.

Section-B (SEE: 50 Marks)

Group-A (20-Marks.)

4. **Design entry tools**: Schematic capture and HDL.

5. Logic and switch level simulation. Static timing. Concepts and tools of analysis,

Group B(30 Marks)

6. **Floor planning**: solution techniques for floor planning,

7. Placement, global routing and detailed routing.

8. Application specific integrated circuit design including FPGA.

Recommended Reference:

1. Jan M. Rabaey, ***Digital Integrated Circuits: A Design Perspective***, Prentice Hall.
2. Abdellatif Bellalaouar, Mohamed I. Elmasry, ***Low-Power Digital VLSI Design: Circuits and Systems***, Kluwer Academic Publishers.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4810 **Course Title: VLSI II Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4809. In the second part, students will design simple systems using the principles learned in EEE 4809.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4811 **Course Title: Optoelectronics**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-2411]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about '**Optoelectronics' in regards to** optical properties in semiconductor, LED, Laser, Photo-detectors and solar cells.

Section A (Mid Term: 30 Marks)

1. Optical properties in semiconductor: Direct and indirect band-gap materials, radiative and non-radiative recombination, optical absorption, photo-generated excess carriers, and minority carrier lifetime, luminescence and quantum efficiency in radiation.

2. Properties of light: Particle and wave nature of light, polarization, interference, diffraction and blackbody radiation.

3. Light emitting diode (LED): Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, structure and coupling to optical fibers.

Section B (SEE -50 Marks)

Group-A (20 Marks)

4. Stimulated emission and light amplification: Spontaneous and stimulated emission, Einstein relations, population inversion, and absorption of radiation, optical feedback and threshold conditions.
5. Semiconductor Lasers: Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, hetero-junction lasers, optical and electrical confinement. Introduction to quantum well lasers.

Group-B (30 Marks)

6. Photo-detectors: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors.
7. Solar cells: Solar energy and spectrum, silicon and Schottkey solar cells.
8. Modulation of light: Phase and amplitude modulation, electro-optic effect, acousto-optic effect and magneto-optic devices. Introduction to integrated optics.

Recommended Reference:

1. O.Kasap, ***Optoelectronics and Photonics***, Prentice Hall.
2. M. A. Parker, ***Physics of Optoelectronics***, CRC, 2005.
3. E. Rosencher, B. Vinter, and P. G. Piva, ***Optoelectronics***, Cambridge University Press.
4. G. Cardinale, ***Optoelectronics: Introductory Theory & Experiments***, Delmar Cengage Learning

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4813 **Course Title: Semiconductor Device Theory**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3607]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Semiconductor Device Theory' in regards to band theory of solid, energy bands, lattice vibrations, band structure of semiconductor, scattering theory**.**

Section A (Mid Term: 30 Marks)

1. Band Theory of Solid: Bloch Theorem, Kronig Penny model, Brillouin zones, Fermi energy, Fermi surfaces,
de Haas-Van Alphen effect,

2. Energy bands: Formation energy bands, Density of states, Origin of band gaps, Application of zone theory.

3. Lattice Vibrations: Vibrations of Lattices, Organization of lattice vibrations, acoustic and optical phonons, phonon momentum, lattice heat capacity, thermal expansion and thermal conductivity.

Section B (SEE -50 Marks)

Group-A (20 Marks)

4. Band structure of semiconductor: Isotropic and anisotropic crystals, band diagrams and effective masses of different semiconductors and alloys.

5. Scattering theory: Review of classical theory, Fermi-Golden rule, scattering rates of different processes, and scattering mechanisms in different semiconductors, mobility.

Group-B (30 Marks)

6. Different carrier transport models: Drift-diffusion theory, ambipolar transport, hydrodynamic model, Boltzman transport equations, quantum mechanical model, and simple applications.

7. **Charge transfer devices**: Dynamic effects in MOS capacitors,, the basic CCD and Application of CCD's.

8. **IC Testing, Bonding and Packaging**: Testing, Wire bonding, Flip-Chip Techniques and Packging.

Recommended Reference:

1. Donald A. Neamen, ***Semiconductor Physics and Devices***, 3rd Ed., McGraw Hill.
2. M.N. Horenstein, ***Solid State Electronic Device***, 5th Edition, Prentice Hall.
3. S. M. Sze, ***Semiconductor Devices Physics and Technology***, John Wiley & Sons.
4. B. G. Streetmen & S.Kumer Banerjee, ***Solid State Electronic Devices***.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Communication Engineering
Course Code: EEE-4723 **Course Title: Microwave Engineering**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course the student will learn about '**Microwave Engineering' in regard to** generation and. transmission of microwave energy and microwave devices.

Section- A (Mid-term: Marks 30)

1. **Transmission Lines*:*** Transmission line equations and parameters; Transmission line configuration and formulae, Transmission line at radio and audio frequency,
2. **Impedance matching**: Line termination, Smith chart, S. W. R. Q and band width, Balanced and unbalanced feeder from transmitter to antenna, Distortion less line.
3. **Wave Guides:** Rectangular and cylindrical wave guides, Cavity resonators, Microstrip lines and their characteristics,

Section –B (SEE -50 Marks)
Group-A (20 marks)

4. **Microwave Components:** Microwave hybrid circuits, scattering parameters, Wave guide Tees, Directional couplers, Circulators and Isolators, Phase shifter and attenuator,
5. **Solid state microwave devices**. Gunn diode, IMPATT Diode, TRAPATI Diode,

Group-B (30 marks)

6. **Microwave Tubes:** Klystron, Magnetron, TWT.
7. **Microwave Antenna:** Hertzian and half wave dipoles. Mono pole, horn, rhombic and parabolic reflector, array, and Yagi-Uda antenna.
8. **Microwave Link:** Microwave link and its advantage, Frequency assignment and modulation methods, Transmitting and receiving equipment, Base band repeater, IF repeater, Microwave carrier supply, Auxiliary channels

Recommended Reference:

1. D. Raddy & Coolen, Electrical Communication.
2. J. D. Ryder, Networks, Lines and Fields.
3. Bronwell and Beam, Theory and Application for Microwave.
4. J.B.Kraus, Antennas.
5. J Reich, Microwave Principle.
6. Y. Liao, Microwave Devices and Circuits Devices.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10

Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4724 **Course Title: Microwave Engineering Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4723. In the second part, students will design simple systems using the principles learned in EEE 4723.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4715 **Course Title: Digital Signal Processing II**
Credit Hours: 3 **Contact Hours: 3 per week**

[Prerequisite course: EEE-3603]

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives : In this course student will learn about Digital Signal Processing in regards to spectral estimation, periodogram, adaptive signal processing, IR filters, multirate DSP and wavelets**.**

Section- A (Mid-term: Marks 30)

1. **Spectral estimation**: Nonparametric methods – discrete random processes, autocorrelation sequence,
2. **Periodogram**; parametric method – autoregressive modeling, forward/backward linear prediction,
3. **Algorithm**: Levinson-Durbin algorithm, minimum variance method and Eigen-structure method I and II.

Section –B (SEE -50 Marks)
Group-A (20 marks)

4. **Adaptive signal processing**: Application, equalization, interference suppression, noise cancellation,
5.**Filters**: IR filters, minimum mean-square error criterion, least mean-square algorithm and recursive least square algorithm.

Group-B (30 marks)

6. **Multirate DSP:** Interpolation and decimation, poly-phase representation and multistage implementation.
7. **Perfect reconstruction filter banks**: Power symmetric, alias-free multi-channel and tree structured filter banks.
8. **Wavelets**: Short time Fourier transform, wavelet transform, discrete time orthogonal wavelets and continuous time wavelet basis.

Recommended Reference:

1. Alan V. Oppenheim, Ronald W. Schafer, Digital Signal Processing.
2. Rabiner and Gold. A, Theory and Application of Digital Signal Processing.
3. William D. Stanley, Digital Signal Processing.
4. J. G. Proakis and D. G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications
5. Richard G. Lyons, Understanding Digital Signal Processing

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4833 **Course Title: Digital Communication**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE 3601 Communication Theory]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**

	SEE: Semester End Examination	**50 Marks**

Objectives: In this course student will learn about 'Digital Communication' in regard to sampling, multiplexing, information theory, source coding, error control coding, video transmission and storage, system noise as regard to digital communication.

Section –A (Mid-term Exam: 30 Marks)

. Digital Communication Overview: Electronic Communications; Sources and sinks of information; ADC, Digital Communication; Radio receivers; Signal transmission, Switching and networks; Advantages of digital communication over analogue communication.

2. Sampling, Multiplexing: Introduction, Pulse modulation, Sampling, Analogue pulse multiplexing, Quantised pulse amplitude modulation, Signal to quantisation noise ratio (SNqR), Pulse code modulation, Bandwidth reduction techniques.

3. Baseband Transmission: Introduction, Baseband centre point detection, Error accumulation over multiple hops, Line coding, Multiplex telephony, Digital signal regeneration, Symbol timing recovery, Repeater design.

Section –B (SEE -50 Marks)

Group A-(20 marks)

4. Information Theory and Source Coding: Introduction, Information and entropy, Conditional entropy and redundancy, Information loss due to noise, Source coding, Variable length coding, Source coding examples.

5. Error Control Coding: Introduction, Hamming distance and codeword weight, (n,k) Block codes, Syndrom decoding, Cyclic codes, Encoding of convolutional codes, Practical coders.

Group B-(30 marks)

6. Video transmission and storage: Introduction, Color representation, Conventional TV transmission systems, High definition TV, Digital video, Video data compression, Compression standards, Packet video**.**

7. Queuing theory and its application in communication: Introduction, The arrival process, the simple server queue, Packet speech transmission.

8. System noise and communications link budgets: Introduction, Physical aspects of noise, System noise calculations, Radio communication link budgets.

Recommended Reference:

1. Ian Glover&Peter Grant, Digital Communications, Prentice-Hall Inc.
2. J.F. Kuross & K. W. Ross, Computer Networking.
3. William Stallings, Data & Computer Communication.
4. Andrew S. Tanenbaum, Computer Networks.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode				

	must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4834 **Course Title: Digital Communication Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per week**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4833. In the second part, students will design simple systems using the principles learned in EEE-4833

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4835 **Course Title: Mobile Cellular Communication**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Section –A (Mid-term Exam: 30 Marks)

1. Cellular Concept: Historical development of Cellular Mobile Communication. A Mobile Wireless to Cellular concept, Frequency reuse and its application for different types of cell design, Co-channel interference and non-co channel interference, other Interferences. Call drops and necessity of Handoffs, types of Handoffs.

2. Capacity Enhancement: Cell design, 4 cell and 7 cell design concept, Cell divisions, Sectoral Antennas for the cell sites for different types of cell design, Types of antennas used in Cell sites,

3. Large scale path loss: Path loss and Path loss models in Mobile Wireless Communications, Foliage loss, Loss due to atmospheric conditions,

Section –B (SEE -50 Marks)

Group A-(20 marks)

4. Small Scale Path loss: Different types of Fading in Mobile Wireless Communications,

5. GSM Architecture: GSM, specifications for cellular telephony, Difference between GSM and other types of Cellular Mobile Communication system, GSM Architecture, Functions of MSC, BSC, BTS and other functional blocks (subsystems and parts) of a GSM system, Situations and Techniques of Handover in GSM

Group B-(30 marks)

6. GSM Channels and Coding: Different types of Channels and Signaling in GSM, Voice and Control channels of a GSM system, Channel Structure and traffic channels, Control Channel and Burst structure, Speech Coding, Channel coding, modulation and power coding in GSM,
7. Advanced Cellular: Enhancement of GSM for Data transmission, GPRS and EDGE, Brief introductions to 3G and 4G Cellular Mobile Communications Systems.
8. AMPS and CDMA: Introduction to AMPS system. channel assignment, An introduction to CDMA in mobile communication and CDMA 2000,

Recommended Reference:

1. Theodor S. Rappaport, Wireless Communications; Principle and Practice.
2. WCY Lee, Cellular communication.
3. Schiller, Mobile Communication.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4837 **Course Title: Telecommunication Engineering**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Telecommunication Engineering' in regards to telephone apparatus, telephone signal and switching, concepts of TDM, traffic engineering, modern telephone services and network as well as cellular mobile telephone.

Section –A (Mid-term Exam: 30 Marks)

1. **Introduction and Telephone apparatus:** Principle, evolution, networks, exchange and international regulatory bodies.microphone, speakers, ringer, pulse and tone dialing mechanism, side-tone mechanism, local and central batteries and advanced features.
2. **Switching system**: Principles of common control touch tone dial telephone, Cross point technology, No. 1 ESS, Japanese D-10, Metaconta. digital switching systems – space division switching, blocking probability and multistage switching, time division switching and two-dimensional switching.
3. **Signal Switching**: Stored program control, Centralized SPC, Distributed SPC, Software architecture, Application software, Enhanced services, Two-stage network, Three-stage network, n-stage network.

Section –B (SEE -50 Marks)

Group A-(20 marks)

4. **Concepts of TDM**: Basic time division space switching, Basic time division time switching, Time multiplexed space switching, Time-multiplexed time switching, Combination switching, Three-stage combination switching, n-stage combination switching.
5. **Traffic Engineering:** Network traffic load and parameters, Grade of service and blocking probability, Modeling switching systems, Incoming traffic and service time characterization, Blocking models and loss estimation, Delay system and queuing.

Group B-(30 marks)

6. **Telephone Networks:** Subscriber loop systems, Switching hierarchy and routing, Transmission plan, Transmission systems. numbering plan Charging plan, signaling techniques, in channel signaling, Common channel signaling.
7. **Modern telephone services and network**: Internet telephony, facsimile, integrated services digital network, asynchronous transfer mode and intelligent networks. Introduction to cellular telephony and satellite communication
8. **Cellular Mobile Telephone:** Mobile telephone systems, Trunking efficiency, Basic cellular system, Performance criteria, Mobile radio environment, Operation of cellular systems, Planning a cellular systems, Analog and digital cellular systems.

Recommended Reference:

1. N.N. Biswas, Principles of Telephony
2. M.T. Hills, Telecommunication Switching Principles
3. T. Viswanathan, Telecommunication Switching Systems and Networks
4. W.C.Y. Lee, Mobile Cellular Telecommunication
5. J.Y. Bryce, Using ISDN
6. J.C. Bellamy, Digital Telephony

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05

x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Interdisciplinary Fields

Course Code: EEE-4825 **Course Title: Biomedical Instrumentation**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Pre requisite: EEE-2411]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Biomedical and Analytical Instrument' in regards to human body, measurement of Bio-signals, blood flow measurement and operation and working principles of different types of biological instruments.

Section –A (Mid-term Exam: 30 Marks)

1. **Physics of human body*:*** The cell, Body fluid, Musculo-skeletal system, Respiratory system, Nervous system, The circulatory system, The body as a control system, The heart, Bioelectricity, Work done by heart, blood pressure and its measurements, Membrane potentials, Electrical activity of excitable cells, Molecular basis of muscle contraction, Basic electrical signals from the muscles.
2. **Interaction of wave and radiation with human body**: Body's detector and matter wave, speech noise, physiological effects of intense matter waves, Interaction of electromagnetic radiation on living mater, penetration of ray's into tissue. Biological effects of ionizing radiation***:*** Dosimetry, primary effects, Biophysical effects of whole body irradiation, radiation measurement and protection.
3. **Biopotentials electrodes and amplifiers*:*** Biopotential electrode, Sensors, Transducers and bioelectric amplifiers, Electromagnetic interference of medical electronic equipment, ENG, EMG, ECG, ERG, EEG, MEG.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. **Ultrasonography*:*** Physics of ultrasonic wave, Ultrasonic transducers, Absorption and attenuation of ultrasound, Scan modes, scan pattern and scanning systems, Doppler imaging, Echocardiography, Ultrasonic flow meter, Ultrasonic blood pressure measurement.
5. **X-ray:** X-ray production, X-ray image formation and contrast, Contrast types, Effects of photon energy, Area contrast, Fluoroscopic imaging system, computed tomography.

Group B. (30 Marks)

6. **Magnetic resonance imaging**: Nuclear magnetic resonance, Image characteristics, Gamma camera.
7. **Analytical and Medical Laboratory Instruments:** Blood components, Colorimeter, spectrophotometer, Blood cell counter, pH/Blood gas analyzer, chromatograph, Auto analyzer, Atomic absorption and atomic emission spectroscopy.

8. **Therapeutic and Prosthetic Devices:** Cardiac pacemaker, Hemodilysis, Defibrillator, Surgical diathermy.

Recommended Reference:

1. C. J. Casey, Biophysics concept and mechanism
2. Joseph J Carr & John M Brown, Introduction to Biomedical equipment technology
3. John G Webster, Medical Instrumentation
4. J. G. Skofronick, Medical Physics

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4826 **Course Title: Biomedical Instrumentation Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE 4825. In the second part, students will design simple systems using the principles learned in EEE 4825.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4827 **Course Title: Measurement and Instrumentation**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Pre requisite: EEE-2411]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course students will learn about 'Measurement and Instrumentation' in regards to measurement system, measuring instruments, measurement of electrical non-electrical quantities, transducers and data transmission.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Reflect a basic understanding of measurement system, measuring instruments, converters, and application of instruments in measuring electrical and non-electrical quantities.	PLO-01	Cognitive/ Understanding
CLO-2	Demonstrate basic proficiency in developing converters, and design measurement system for electrical and non-electrical quantities.	PLO-03	Psychomotor/ Manipulation
CLO-3	Apply the necessary learning skills in industrial electrical and various non electrical measurements and data processing sector.	PLO-02	Cognitive/ Apply

Section-A (Mid-term Exam: 30 Marks)

1. **Introduction**: Applications, Methods, functional elements of a measurement system and classification of instruments.
2. **Measurement of electrical quantities**: Current and voltage, power and energy measurement. (PMMC and Electrodynamometer Type instruments).
3. **Instruments**: Rectifier type instruments (elements, characteristics, types, sensitivity), Instrument Transformer: Current and Potential Transformer.

Section-B (SEE: 50 Marks)

Group-A (20-Marks

4. **Transducer**: Mechanical, Electrical and Optical.
5. **Measurement of non-electrical quantities**: Temperature, pressure, flow, level, strain, force and torque.

Group-B (30-Marks)

6. **Data Transmission and Telemetry**: Methods of data transmission, dc/ac telemetry system and digital data transmission.
7. **Basic elements of dc and ac signal conditioning**: Instrumentation amplifier, noise and source of noise, noise elimination compensation, function generation and linearization.
8. **Converters**: A/D and D/A converters, sample and hold circuits.

Recommended Reference:

1. A.K. Sawhney & Puneet Sawhney, ***A Course in Electrical and Electronic Measurements and Instrumentation***, 17th ed., India: Dhanpat Rai & Co., 2006.
2. B. C. Nakra & K. K. Chaudhry, ***Instrumentation Measurement and Analysis***, 4th ed., India: McGraw Hill India., 2016. Digital Systems: Principles and Applications
3. Ronald J. Tocci, Neal Widmer & Gregory L. Moss, ***Digital Systems: Principles and Applications***, 10th ed., USA: Prentice Hall., 2006.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4828 **Course Title: Measurement and Instrumentation Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.**
Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: This course consists of two parts. In the first part, students will perform experiments to verify practically the theories and concepts learned in EEE-4827. In the second part, students will design simple systems using the principles learned in EEE-4827.

S/N	Course Learning Outcomes (COs): Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy

			domain/level
CL O-1	Reflect a basic understanding of measuring instruments, tools, sensors and application of these in measuring electrical and non-electrical quantities.	PLO-05	Cognitive/ Understanding
CL O-2	Design different type of system for home and industrial application using sensors.	PLO-03	Cognitive/ Designing
CL O-3	Apply the necessary practical skills in industrial electrical and various non-electrical measurements for public health, social and safety issues.	PLO-06	Psychomotor/ Manipulation

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4843 **Course Title: Renewable Energy System**
Credit Hours: 3 **Contact Hours: 3 per week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Renewable Energy System' in regards to solar constants, solar collectors and their characteristics, solar cells, wind energy and other non-conventional energy**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CL O-1	Understand the need for sustainable development through the knowledge of world energy scenario and energy scenario of Bangladesh. Also, they will learn modern conversion technologies for different types of RE sources such as Solar energy, Wind Energy, Biomass energy, Tidal Energy, Wave Energy, Biofuels etc.	PLO-07	Cognitive/ Understanding
CL O-2	Identify problems and providing solutions using RE technologies for the better environmental and social human life.	PLO-06	Cognitive/ Analyzing
CL O-3	Design and demonstrating proficiency in the development of RE-based power system and integration of RE technologies with the power grid.	PLO-03	Cognitive/ Designing

Section- A (Mid-term: Marks 30)

1. Introduction: Importance of Renewable energy, Sustainable energy and sustainable development, World energy scenario: demand and reserve, Future energy solution, Source of non-Conventional energy, Energy scenario of Bangladesh, Introduction to different renewable energy sources, Statistics regarding solar radiation and wind speed, Solar geometry: Solar constant, Azimuth, Zenith angle, clearness index, Declination, Day length, hour angle, Air mass, solar radiation etc., Topics include environmental benefits of solar energy.

2. Solar Radiation measurement and Solar energy conversion: Estimation of solar radiation: Mathematical approach; Measurement of solar radiation; Different types of Pyranometer: Thermopile Pyranometer, Photovoltaic Pyranometer etc.; Different methods of solar energy conversion system; Solar thermal power generation; Active and passive solar design.

3. Solar energy collectors: Flat plate collectors, Concentrating collectors, Evacuated tube collector, collector, enclosed trough type collector, CSP, Solar pumping, collector efficiency factor, heat removal factor and flow rate factor.

Section –B (SEE -50 Marks)

Group-A (20 marks)

4. Solar Cells: Theory of Solar cell: Principle of operation, characteristics and construction of a solar cell, classification of solar cell, equivalent circuit, factors affecting conversion efficiency, maximum power output, Optimization of cell design, different types of solar cell in details etc.; Photovoltaic (PV) modules and arrays: stationary and tracking; Mismatch effect of solar cell; degradation and failure of solar cell; Maintenance and protection of PV module; urban/rural applications.

5. PV system, Energy storage and Radiation characteristics: PV system design: stand alone; hybrid photovoltaic/thermal systems, battery storage, reliability indices for PV system; Different types of energy storage, sensible heat storage, latent heat storage; Absorption, transmittance, reflectance, selective surfaces.

Group -B (30 marks)

6. Wind Energy: Wind energy conversion systems: Basic principle of operation, classification of wind turbine generators (WTG), output power equation, wind turbine components, efficiency, output power characteristics etc.; different types of modern technologies for harvesting wind energy; Installation of wind farm: types of wind farm, wind speed assessment, site selection, determination of potentiality of wind energy and application to power generation, estimation of expected power, cost, and capacity factor etc.

7. Renewable Energy Penetration on the Power Grid: Problems related to integration of RE sources with the power grid; interfacing primary sources; generator/load characteristics; Modern technologies for interfacing RE sources with the power grid; Solar energy grid interfacing: grid-interactive PV system configurations and associated control systems for stable output power from PV; Wind energy grid interfacing: Modern WTG such as DFIG, PMSG systems, and its associated control systems for controlling output power, voltage, frequency etc., impact of variability of wind turbine output on power system, impact of wind energy penetration on power system dynamics and stability ; battery charging/management; AC and DC hybrid system with the interconnection of RE sources.

8. **Other non-conventional energy**: Biomass energy, tidal energy conversion, geothermal energy, wave energy generator, Biofuel, Micro-hydro, Fuel-cell etc.

Recommended Reference:

1. Gilbert M. Masters, “Renewable and Efficient Electric Power Systems” John Wiley & Sons, Inc., Hoboken, New Jersey, USA, ISBN 0-471-28060-7, Year 2004.
2. G. R. Nagpal, S.C. Sharma, “Power Plant Engineering” G R. Edition 15, Khanna Publisher, ISBN-10: 8174091556, ISBN-13: 9788174091550, Year 2007.
3. I. Munteanu, E. Ceanga, “Optimal control of Wind Energy Systems”, Springer, ISBN: 978-1-84800-079-7, Year 2008.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4844 **Course Title: Renewable Energy System Sessional**
Credit Hours: 3 **Contact Hours: 3 per week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4843.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	Get the basic **understanding** about operation and characteristics of modern conversion technologies of Renewable Energy (RE) harvesting technologies such as solar cell, wind turbine etc. and investigation of potentiality of RE sources for different location.	PLO-01,	Cognitive/ Understanding
CLO-2	Demonstrating proficiency in **Design** and development of the stand-alone solar home system (SHS).	PLO-03	Cognitive/ Designing;
CLO-3	RE-based power system using **modern simulation tools** such as MATLAB, PSCAD, Homer etc., and power quality analysis for the integration of RE technologies with the power grid.	PLO-05	Cognitive/ Analyzing

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for

attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4841 **Course Title: Antenna & Propagation**
Credit Hours: 3 **Contact Hours: 3 per Week**
[Pre requisite: EEE-3601]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: The *objective* of this *course* is to introduce the fundamental ideas of the antenna and propagation.

Section –A (Mid-term Exam: 30 Marks)

1) Antenna Basics: Radiation fields of elemental dipoles. Antenna patterns and antenna parameters: beamwidth, directivity, gain, side-lobes, linear polarization, circular polarization, radiation resistance.
2) Antenna Basics: equivalent circuit of receiving antenna, effective length, capture area, Friis transmission formula. Reciprocity theorem. Radiation by dynamic currents and charges, retarded potentials, isotropic source. Half-wave dipole, loop antenna.
3) Antenna Arrays: Two-element array, N-element linear array, phased array, uniform spacing and amplitude, non-uniform amplitude, planar array.

Section- B (SEE: 50 Marks)

Group- A (20-Marks)

4) Analysis of Different types of Antennas: Biconical antenna, cylindrical dipole, folded dipole, Monopole antenna, V Antennas, Inverted V Antennas, J-pole antenna, rhombic antenna, helical antenna, Yagi-Uda arrays,
5) Analysis of Different types of Antennas: log-periodic antenna, slot, micro strip antenna, rectangular horn Antenna, circular horn antenna, Cassegrain Antenna, parabolic reflectors, lenses.

Group-B (30 Marks)

6) Radio Wave Propagation: Electromagnetic waves, wave front, characteristic impedance of free space, reflection, refraction and diffraction. Ground waves and sky waves.
7) Radio Wave Propagation: The ionospheric layers, refractive index, virtual height, critical frequency and angle, maximum usable frequency, skip zone, skip distance, fading.
8) Radio Wave Propagation: VHF line of sight transmission. Tropospheric scattering communications. Relationship between transmitter power, antenna gains and received signal to noise in a free space radio link. VHF and microwave point-to-point link.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15

Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4842 **Course Title: Antenna & Propagation Sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4841.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Code: EEE-4845 **Course Title: Embedded system**
Credit Hours: 3 **Contact Hours: 3 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course students will learn the basics of designing, interfacing, configuring, and programming embedded systems. They will make use of the PIC microcontroller, which is an inexpensive, popular embedded microcontroller used by hobbyists, researchers, and in industry, to implement the techniques learned in class.

Section- A (Mid-term: Marks 30)

(1) Introduction of Embedded System and Microcontroller Architecture: Definition, characteristics, application and challenges in embedded system design, use of microprocessor in embedded system, embedded system design process, inside the embedded system, Microcontroller, Microcontroller architecture, inside the microcontroller, Commercial microcontroller devices, and selection of microcontroller.

(2) Embedded Microcontroller and Programming: Block diagram, pin functions and features of 8051/PIC16F887 (or any other) microcontroller, Programming language (Machine, Assembly and high

level language), Basics of C (data type, variable, constants, operator, conditional operator, loop, array and functions), Assembly language Instructions.

(3) Parallel I/O ports: Parallel Ports (Simple parallel and multifunctional parallel I/O ports), Use of parallel ports, Pull-up resistor, I/O Ports of PIC16F887 (or any other) microcontroller, interfacing microcontroller with switch, LED, Single &multiple LED segment display, matrix display and digital sensors.

Section –B (SEE -50 Marks)

Group-A (20 marks)

(4) Some important I/O interface and Interrupt System: LCD display, Key pad, electromagnetic relay, DC motor and servo motor interfacing, interfacing with digital sensors (Ultrasonic, IR, motion, sound sensor etc.), Interrupt definition and sources, recognizing an interrupt, Interrupt System of PIC16F887 (or any other) microcontroller, Application of interrupt in real time system.

(5) Timer/Counter: Purpose and application of timer/counter, Timer counter in PIC16F887 (or any other) microcontroller, operation in timer mode and counter mode, use of prescaler and interrupt in timer operation, Application of timer/counter in real time system.

Group -B (30 marks)

(6) Interfacing to analog world: Analog to digital conversion techniques, quantization error, sampling rate, A/D Converter inside PIC16F887 (or any other) microcontroller, Sensor interfacing (LDR, thermistor, Gas sensor etc.), Applications such as digital voltmeter, light intensity measurement etc.

(7) Serial Communication: Basic Serial Port operation, USART, Serial peripheral interface (SPI), inter-IC (I2C) serial interface, Serial communication modules of PIC16F887 (or any other) microcontroller, Application of serial communication in real time system.

(8) FPGA: FPGA definition and application, FPGA Vs ASICs and ASSPs, History of FPGA, FPGA architecture, FPGA programming language, Verilog HDL, Structural Verilog coding, RTL Verilog coding for combinational and sequential digital circuit, Design of RAM and bi directional I/O ports in FPGA.

Recommended Reference:

1. Milan Verle, ***PIC Microcontroller***, 1st edition, mikroElectrica, 2009.
2. Steve Heath, ***Embedded System Design***.
3. Wayne Wolf, ***Computer as components***.
4. Md. Liakot Ali, ***Verilog HDL: An easy approach for beginners***.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Code: EEE-4846 **Course Title: Embedded system sessional**
Credit Hours: 1.5 **Contact Hours: 3 per Week**
Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4845.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).
A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,
B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

Course Title: EEE-4847 **Course Title: Optical Fiber Communication**
Credit Hours: 3 **Contact Hours: 3 per week**
[Prerequisite course: EEE-3601]

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will lean about 'Optical fiber Communication' in regards to characteristics optical fiber, light sources and detectors for optical communication, noises, receiver analysis, optical amplifier and multi-channel optical system.

Section- A (Mid-term: Marks 30)

1. **Introduction**: Principle of light transmission in a fiber, propagation of light in an optical fiber, ray model and wave model.
2. **Optical fiber**: Types and characteristics, transmission characteristics, fiber joints and fiber couplers.
3. **Losses in fibers,** Dispersion, Power and rise time budget, SNR and BER calculations,

Section –B (SEE -50 Marks)

Group-A (20 marks)

4. **Light sources and detectors**: Light emitting diodes and laser diodes. PIN photo-detector and avalanche photo-detectors, Photo detector connector and splices.
5. **Coherent optical communication**: Introduction, WDM systems, Devices for coherent optical communication, Chromatic dispersion, nonlinear refraction, four wave mixing and laser phase noises.

Group-B (30 marks)

6. **Receiver analysis**: Direct detection and coherent detection, noise and limitations.
7. **Optical amplifier**: Laser and fiber amplifiers, applications and limitations. Introduction to high-speed long-distance fiber optic links.

8. **Multi-channel optical system:** Frequency division multiplexing, wavelength division multiplexing and co-channel interference.

Recommended Reference:

1. S.E.Miller & A.G. Chynoweth, ***Optical Fiber Telecommunication***.
2. Barnoski, ***Fundamentals of Optical Fiber Communication***.
3. Chrin, ***An Introduction to Optical Fiber***.
4. J. M. Senior, ***Optical Fiber Communication***.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Project evaluation & Viva

Course Title: EEE-4848 **Course Title: Optical Fiber Communication Sessional**
Credit Hours: 3 **Contact Hours: 3 per week**

Marks distribution for Sessional courses: There are 100 marks for each Sessional course**.** Out of 100 marks, 50-60 marks is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and 40-50 marks is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE)**

Objectives: In this course students will perform experiments to verify practically the theories and concepts learned in EEE-4847.

Course Assessment Pattern (Sessional Courses): There are 100 marks for each Sessional course**.** Out of 100 marks, **50-60 marks** is allotted for continuous assessment on Lab. activities including 10 marks for attendance **(CIE**) and **40-50 marks** is for practical exam at the end of Semester, viva, quiz etc. at the end of semester final examination **(SEE**).

A. **Delivery methods & activities**: Lecture, White Board Writing, Power point Presentation, Practical Demonstration, Data Collection, Data Analysis, Report Writing, Q/A, discussion,

B. **Assessment tools**: Class Attendance, Assignment, Lab Report, Quizzes, Lab Exams. (Mid & Final), Table Viva

F. University Requirement Courses

Course Code: UREL 1106 **Course Title: Advanced English**
Credits hours: 2 **Contact hours: 2 contact hours per week**

Course Assessments	CIE: Continuous Internal Evaluation	Attendance	10 Marks
		Class test/ Assignment/ Quizzes	10 Marks
		Mid-term	30 Marks
	SEE: Semester End Examination		50 Marks

Course Objectives: The objectives of the course are:

1. To develop four basic skills of English (i.e. Listening, Speaking, Reading and Writing) to a level that the students can comprehend lectures given in English, comprehend literary, non-literary, formal and informal texts and communicate effectively both orally and in written form.
2. To prepare the students for IELTS/TOEFL exams so that students can take these exams for their higher study abroad.
3. To improve the students' comprehending capability of English language and communication skill by practicing in the class room and by doing home works.
4. To develop students' confidence in their own speaking and writing by teaching them essential grammatical points so that they can identify the errors and correct the same themselves.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO 1	Acquire four skills of English language which enable them to study, analyze, explain both orally and in written form different aspects of science and engineering.	IIUC MS-1	Cognitive/ Applying
CLO 2	Understand the lectures given in English and write answers in the examination using correct and standard English.	IIUC MS-2	Cognitive/ Applying
CLO 3	Communicate effectively in relation with science and engineering by overcoming English language barriers.	IIUC MS-2	Cognitive/ Understanding
CLO 4	Get good grades in all international examinations, competitive examinations as well as internal examinations by using fluency in both spoken and written English.	IIUC MS-2	Cognitive/ Applying
CLO 5	Study and comprehend Science and Engineering texts, reference books which are written in English, engineering and science related articles in national and international journals and acquire substantial knowledge about science and engineering.	IIUC MS-3	Cognitive/ Applying
CLO 6	Develop a self confidence in the use of English all through the science and engineering career and thus to achieve a lucrative social status.	IIUC MS-3	Cognitive/ Understanding

Course Content

Weeks+ CLOs	**Topics** **Section-A (Mid-term Exam: 30 Marks)**
W-1	Sections: 1C, 2C, 3B & 3C From the following text:-

3 Contact Hours (CH)	*Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House Burnt Mill, Essex, UK Activities: Vocabulary (synonym/antonym/formation of sentences with words/filling in the gaps, answering comprehension questions, summarizing the passage) Students will also have to practice reading texts and take mock tests from: https://www.ielts-up.com/reading/ielts-reading-practice.html#academic
W-2 **3 Contact Hours (CH)**	Sections: 4C, 5A, 5C, 6C From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House, Burnt Mill, Essex, UK Activities: Comprehension (understanding sentences structure, answering short questions, using vocabulary to form own sentences and summarizing the passage) Students will have to practice articles of Dhaka courier, news reports from daily newspapers and so on.
W-3 **3 Contact Hours (CH)**	Sections: 7C, 8A, 9C, 10C From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House, Burnt Mill, Essex, UK Activities: Comprehension (understanding sentences structure, answering short questions, using vocabulary to form own sentences, practicing grammatical structures etc.) As preparation for unseen passages students will have to read extracts from English literature, great books and articles from different journals.
CLO of three weeks	By the end of three weeks students are expected to have developed certain level of comprehending English texts, a skill to use a good number vocabulary items in their language and basic idea of the reading module of IELTS and other international examinations. **A certain levels of CLOs 1, 2, 5, 6 are expected to be achieved after three weeks.**
W-4 **3 Contact Hours (CH)**	1. Sentence writing and composition: sentence variety, (Construction of assertive, imperative, interrogative, optative, exclamatory, simple, complex, compound), common errors (use of active in place of passive and vice versa/sequence of tense/WH questions/ Y/N questions etc.) 2. Composition: Paragraph (free and guided), Writing/completing a story
W-5 **3 Contact Hours (CH)**	**Speaking:** Students will practice how to introduce themselves as well as others in front of audience. They will practice role playing and dialogues on different situation. Students will use the following link to know about IELTS speaking module and to practice:- https://www.ielts-up.com/speaking/ielts-speaking-practice.html
W-6 **3 Contact Hours (CH)**	**Listening**: Students will practice listening at the department lab or using their own android. The teacher can also use listening devices at the class. The students can use the following link to practice listening: https://www.ielts-up.com/listening/ielts-listening-practice.html
CLO of three weeks	By the end of three weeks students are expected to have developed certain level of ability to express their feeling in front of audience and to comprehend English speaking of native speakers which will encourage them to further preparation for speaking and listening modules of IELTS and other international examinations. They are also expected to have

	developed the idea of using correct sentence structures and identify errors related with voice, WH questions, Y/N questions etc. **A certain levels of CLOs 3 and 4 are expected to be achieved after three weeks.**
	Section-02: SEE; 50 marks.: Reading-1 (Seen-15), Reading-2 (Unseen-10), Writing-1 (Sentence Construction)-10, Writing-2 (composition)-05, Listening-05, Speaking-05 No. of weeks: 9 (nine) No. of classes: 27 (twenty seven)
Weeks+ CLOs	**Topics**
W-1 3 Contact Hours	Sections: 11C,12C,13C, From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House Burnt Mill, Essex, UK Activities: Vocabulary (synonym/antonym/formation of sentences with words/filling in the gaps, finding synonyms from the passage, summarizing the passage, finding use of grammatical points in the passage, answering short questions, talking about the content of the passage, creating dialogues using the contents of the passage and so on) **Students will also practice reading passages of IELTS reading module from the following link:** https://www.ielts-up.com/reading/ielts-reading-practice.html#academic
W-2 3 Contact Hours	Sections:14B,14C ,15B, From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House Burnt Mill, Essex, UK Activities: Vocabulary (synonym/antonym/formation of sentences with words/filling in the gaps, finding synonyms from the passage, summarizing the passage, finding use of grammatical points in the passage, answering short questions, talking about the content of the passage, creating dialogues using the contents of the passage and so on) **Students will also practice reading passages of IELTS reading module from the following link:** https://www.ielts-up.com/reading/ielts-reading-practice.html#academic
W-3 3 Contact Hours	Sections:15C,16A ,16C, From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House, Burnt Mill, Essex, UK Activities: Vocabulary (synonym/antonym/formation of sentences with words/filling in the gaps, finding synonyms from the passage, summarizing the passage, finding use of grammatical points in the passage, answering short questions, talking about the content of the passage, creating dialogues using the contents of the passage and so on) **Students will also practice reading passages of IELTS reading module from the following link:** https://www.ielts-up.com/reading/ielts-reading-practice.html#academic
W-4 3 Contact Hours	Sections:17C,18B ,18C, From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House, Burnt Mill, Essex, UK Activities: Vocabulary (synonym/antonym/formation of sentences with words/filling in the gaps, finding synonyms from the passage, summarizing the passage, finding use of grammatical points in the passage, answering short questions, talking about the content of the passage, creating dialogues using the contents of the passage and so on)

	Students will also practice reading passages of IELTS reading module from the following link: https://www.ielts-up.com/reading/ielts-reading-practice.html#academic
W-5, 3 Contact Hours	Sections:19,20 From the following text:- *Exercises in Reading Comprehension* Edited by: E.L. Tibbits Longman Group Limited, Longman House, Burnt Mill, Essex, UK Activities: Vocabulary (synonym/antonym/formation of sentences with words/filling in the gaps, finding synonyms from the passage, summarizing the passage, finding use of grammatical points in the passage, answering short questions, talking about the content of the passage, creating dialogues using the contents of the passage and so on) **Students will also practice reading passages of IELTS reading module from the following link:** https://www.ielts-up.com/reading/ielts-reading-practice.html#academic
CLO of five weeks	By the end of five weeks students are expected to have developed advanced level of comprehending English texts, a skill to use a large number vocabulary items in their language and a thorough idea of the reading module of IELTS and other international examinations. They are expected to have developed the skill of reading and comprehending English texts to the level which has been described in the objectives of the course. **An advanced level of COs 1,2,5, 6 are expected to be achieved after three weeks.**
W-6, 3 Contact Hours (CH)	**Sentence writing and composition**: common grammatical problems, tense, article, preposition, subject verb agreement, clause, modals, conditional sentence.
W-7, 3 Contact Hours	**Composition**: Describing pie chart, column chart, graphs, tables, agreeing/ disagreeing on some opinion, Business letters, formal and informal letters.
W-8 3 Contact Hours	**Speaking:** Students will practice how to describe people and places, how to narrate events. They will practice extempore speeches and drill with presentation techniques. Moreover students will use the following link to know about IELTS speaking module and to practice:- https://www.ielts-up.com/speaking/ielts-speaking-practice.html
W-9 3 Contact Hours	**Listening**: Students will practice listening at the department lab or using their own android. The teacher can also use listening devices at the class. The students can use the following link to practice listening: https://www.ielts-up.com/listening/ielts-listening-practice.html Review and class test: A review class will be held to solve any problem which students are deemed to have faced in the topics they have so far studied. The review class will be followed by class test.
CO of four weeks	By the end of last four weeks students are expected to have developed an advanced level of ability to talk on any subject in front of audience and to comprehend English speaking of native speakers which will encourage them to further study and preparation for speaking and listening modules of IELTS and other international examinations. They are expected to have developed a skill of writing on any topic and an ability to get a good score in writing module of international examinations. They are expected to have been equipped with four skills of English language which will help them to study other courses in their forthcoming semesters. **An advanced level of COs 3 and 4 are expected to be achieved after three weeks.**

Books Recommended:

1. Text Book: Exercises in Reading Comprehension,
   Edited by: E.L. Tibbitts,
   Longman House Harlow,

Essex, UK
2. Raymond Murphy, *Intermediate English Grammar*, Foundation Books, 2/19 Ansari Road, Daryaganj, New Delhi-110002, ManasSaikia, 1995. (Published by arrangement with Cambridge University Press, The Edinburgh Building, and Shaftsbury Road, Cambridge CB2 2RU, U.K.).
3. Wren & Martin, *High School English Grammar and Composition*-, New Delhi, S. Chand & Company Ltd. 2002.
4. Thomson & Martinet, *Practical English Grammar*, Oxford University Press, Walton Street, Oxford OX2 6DP, 1993 (reprinted in India by arrangement with Oxford University Press).
5. Michael A. Pyle and Mary Ellen Munoz, *Cliffs TOEFL Preparation Guide*, New Delhi, BPB Publications, B-14, Connaught Place, New Delhi-110001, 1992.
6. Bruce Rogers, *Peterson's TOEFL Success*, Princeton, New Jersey, Peterson's, 2000.
7. AS Hornby, *Oxford Advanced Learner's Dictionary of Current English*, Oxford University Press, 2002-2003.
8. Chowdhury & Hossain, *Advanced English*, Dhaka, Sayma Chowdhury and Halima Chowdhury, 2004.
9. Mohammad SarwarAlam& Mohammad Taher Hossain Salim, *English Sentences: Learning through Structures & Functions*, Friends' Book Corner, 16 Rafin Plaza 2nd floor, 3/B Mirpur Rood, Dhaka- Bangladesh. 2018
10. Build up Your English, A.J. Glover, The English Language Book Society and J.M. Dents and Sons Ltd. London

- http://www.dhakacourier.com.bd/
- http://ielts-up.com/reading/ielts-reading-practice.html#academic
- https://allmedialink.com/english-newspaper-of-bangladesh/
- http://www.indiacelebrating.com/paragraph/paragraph-on-moral-values/
- https://www.vocabulary.com/
- https://helloenglish.com/

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation;, SEE= Semester End Examination.

Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions

Power point Presentation,

Assessment tools: Class Attendance, Class test, Quizzes/ Assignment.

Mid-Term & Final Exam. Project evaluation & Viva.

Course Code: UREM-1101. **Course Title: Text of Ethics and Morality**
Credit Hours: 1 **Contact Hours: 2 Contact Hours per Week**

Course Assessments	CIE: Continuous Internal Evaluation	Attendance	10 Marks
		Class Test/ Assignment/ Quizzes	10 Marks
		Mid-term	30 Marks
	SEE: Semester End Examination		50 Marks

Course Objectives: The main objectives of this course are:
To make students capable of understanding the text of the Holy Qur'an so that they can understand the rules of ethics from the main and basic ethical book as well as to make students capable of understanding the basic Arabic language so that they can communicate with the foreign countries and be fit with labor market worldwide especially in the Middle East. To inspire students in reading the Holy *Qur'an, which is* the complete code of life . To make students familiar with *Ayats* of *Ahkam* of the Holy *Qur'an* so that they can lead their life being enlightened with them.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO-1	understand the text of the Holy Qur'an as well as the basic Arabic language to communicate easily in the job market globally.	**IIUCMS-1**	Cognitive/ Understanding
CLO-2	understand the rules of ethics and morality from the basic ethical book –the holy Quran.	**IIUCMS-1**	Cognitive/ Understanding
CLO-3	achieve knowledge on the various legal issues that are depicted in Qur'anic texts related to different laws of human life as well as able to save themselves from any evil activity, which boost up morally throughout their professional life.	**IIUCMS-3**	Cognitive/ Applying

Course Outline ***Section-A (Midterm Exam: 30 Marks)***		Contact hours	CLOs
Chapter# 01	1. An introduction to the text of Ethics and Morality. 2. Selected text on the introductory chapter of a valuable Ethical Book - the holy Qur'an 3. An introduction to Arabic language. 4. Identifying the forms of Arabic alphabet with example.	04	**CLO-1**

Chapter# 02	1. Selected text on procreation of the creation of humankind: 22:5 2. Selected text on Islamic monotheism*:* 2: 1-5; 112: 1-4 3. Text on ensuring social peace by removing bad behavior 49:10-12 4. The sun letters and the moon letters 5. Arabic numbers and common Arabic words used in daily life. 6. Arabic prepositions.	06	**CLO-1**
Chapter# 03	1. Selected text on duties and obligations towards family and relatives = 4: 34-36. 2. Selected text on the transition of human life: 10:24. 3. Selected text on the rule of livelihood = 2: 172- 174, 5:3-5. 4. Exercise of Arabic demonstrative pronouns.	04	**CLO2**
Section-B (SEE: 50 Marks)			
Chapter# 04	1. Selected text on the rule and impact of interest (*al-riba*) and loan = 2: 275-279. 2. Selected Text on the rules and impact of drug and gambling =5: 90-91 3. Exercise of Arabic interrogative pronoun. 4. The name of days and months in Arabic. 5. Formation of Arabic word	05	**CLO 2 & 3**
Chapter# 05	1. Selected Text on the rules and ethical directions of marriage, *ma*hr and veil: 4: 2-4; 24: 30-31, 33:59. 2. Text on the rule and ethical directions of divorce 2:227-230 6. The names directions in Arabic. 3. Formation of verb in Arabic.	03	**CLO 1 &2**
Chapter# 06	1. **Formation** of particle in Arabic. *2.* Selected text on the sermon of a father to his son =31:13-19.	02	**CLO-1**
Chapter#	1. Selected text on the characteristics of human beings = 23:1-11;	02	**CLO-**

07	25: 63-76		**1**
Chapter# 08	1. Formation of Arabic sentence. 2. Conversation in Arabic: 'Yourself'.	04	**CLO-1**
		30 CH	

Text Books:

1. Abbott, N., Studies in Arabic literary papyri II, Qur'anic commentary and tradition, Chicago: University of Chicago, 1967.
2. Dr. M. Fazlur Rahman, Everyday Arabic Conversation, Riyad Prokashani, Dhaka, 2005.
3. Haleem, M. A., Understanding the Qur'an: themes and Style, London: I. B. Tauris, 1999.
4. Izzath Uroosa, Learning Arabic Language of the Qur'an, Darussalam, Riyadh, 2010.
5. Saheeh International, The Qur'an Arabic Text with Corresponding English Meanings, Jeddah, Saudi Arabia, 1997.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		**Evaluations out of 100 marks**			
		CIE (50 marks)			**SEE (50 marks)**
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	-	-	-	5
Understand	-	5	5	-	5
Apply	-	5	-	-	10
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	10
Create	-	5	-	-	10
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation s, SEE= Semester End Examination

A. Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation

B. Assessment tools: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Current issues evolution of Bangladesh & Viva

Course Code: URED-1201.
Course Title: Basic Principles of Islam (*Aqidah* + '*Ibadah*)

Credit Hours: 2 **Contact Hours: 2 Contact Hours per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Course Objectives: This course is designed to provide the students with proper and pure knowledge and clear and comprehensive ideas regarding the basic principles of Islam removing some misconceptions & traditional superstitions contradicting the basic faith & tenets of Islam to inspire them to help correct faith and appropriate principles in their practical lives. This course also covers the clear and comprehensive concept of *'Ibadah* in Islam to encourage the readers to be used to it and to illuminate every walk of life in accordance with the lessons derived from it as the slaves of Allah (SWT).

S/N	**Course Learning Outcomes (CLOs)**: Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO-1	equipped with the knowledge and conception regarding the Islamic beliefs and Islamic rituals, which will inspire them to lead their lives in accordance with Islamic guidance with ethically, developed ones.	IIUCMS-1	Cognitive/ Understanding
CLO-2	acquire knowledge to defend Islamic faith form contemporary misconceptions & traditional superstitions contradicting the basic faith & tenets of Islam as well as able to enlighten every walks of their lives with the widespread impacts of '*Ibadah*.	IIUCMS-2	Cognitive/ Applying
CLO-3	have an exalted standard of Islamic faith and rituals free from polytheism and faithlessness to save them from severe punishment of the hereafter	IIUCMS-1	Cognitive/ Understanding
CO-4	become practicing Muslims holding proper beliefs of Islam and performing rituals of Islam.	IIUCMS-3	Cognitive/ Applying

Course Content

Section-A (Midterm Exam: 30 Marks)		Contact Hrs.	CLOs
Chapter # 01	Islam: An introduction: (a) Islam: Its definition and characteristics (b) Islamic '*Aqidah*: Its definition and importance.	**04**	**CLO 1**
Chapter # 02	Articles of Faith (Pillars of *Iman*): Believe in Allah (*SWT*): (1) Existence of Allah (*SWT*) (2) *Tawhid*: Definition and classifications (*Tawhid Al-Rabubiah, Tawhid Al-Uluhiyyah and Tawhid Al-Asma Was-Sifat)* (3) Impact of *Tawhid*. *Shirk*: (1) Definition, classifications and consequences (2) Examples of some Shirks in the contemporary society. Belief in Allah's Angels (*Malaikah*): (a) Belief in Angels of Allah (*SWT*): Its meaning, their Nature and Functions (b) Benefits of belief in Angels.	**06**	**CLO 1 CLO 2**

	Belief in the Books of Allah: (a) Belief in the Books of Allah: Its meaning and an introduction to the revealed Books and Scriptures (b) The position of the Holy *Qur'an* amongst the other revealed Books (c) Benefits of belief in the Books of Allah (*SWT*).		
Chapter # 03	Belief in Allah's Prophets: (a) Belief in Allah's Prophets: Its meaning and purpose of their sending (b) Features of Prophethood and Contributions of the Prophets towards the Humanity (c) Muhammad (*SAW*) is the greatest, the best and the last among all the Prophets and Messengers. Belief in the *Akhirah* (Life After Death): (a) Definition and Stages of *Akhirah* (b)The logic and evidence regarding *Akhirah* (c) Impact and benefits of belief in *Akhirah*. Belief in *Qadr*/ *Taqdir* (Fate) and divine decree: (a) Definition of belief in *Qadr/ Taqdir* (b) Opinions of the scholars regarding *Taqdir* (c) Concept of man's freedom of will in Islam. The nullifiers of *Iman*: (a) *Kufr* and *Nifaq*: Definition, classifications and consequences (b) Description of the nullifiers of *Iman* in details.	04	**CLO 3**
***Section-B (*SEE-50 marks)**			
Chapter # 04	***'Ibadah*: Its introduction:** (a) Meaning of *'Ibadah* (b) Various types of *'Ibadah* (c) The best *'Ibadah* (d) Objectives and aims of *'Ibadah*. (e) Conditions of *'Ibadah*.	02	**CLO2**
Chapter # 05	**Characteristics of *'Ibadah* and signs of *'Ibadur Rahman*:** Characteristics of *'Ibadah* in Islam:Free from Intermediaries, Not being confined to specific places, All-Embracing View (Scope of *'Ibadah)*...etc. **Signs of *'Ibadur Rahman* (Servent of *Ar-Rahman*):** According to the holy *Qur'an*. ***Taharah&Najasah*:** Definition of ***Taharah*** (purity) and ***Najasah*** (impurity). Ways and means of *Taharah*: *Wadu*, *Gusl*,	04	**CLO2 CLO3**
Chapter # 06	**<u>Some Articles of Islam (Pillars of Islam) and Defense system of Islam:</u>** ***Salah* (Prayer): Its significance, teachings & some basic rules:** (a) Definition and kinds (b) Importance (c) Pre requisites of *Salah* (*Shurutus-Salah*) (d)Essentials/ Basic components of *Salah* (*Arkanus-Salah*) (e) How to perform the *Salah* in detail (practically)? (f) Things that invalidate the prayer (*Mufsidatus-Salah*) (g) *Sajdah* that makes prayer correct (*Sajdatus-Sahu*) (h) Friday prayer (*Salatul-Jumu'ah*) (i) The funeral prayer (*Salatul-Janazah*) (j) Prayer of the traveler (*Salatul-Musafir*) (k) '*Eid* prayer (*Salatul-'Eid*) (l) Impact of *Salah*. ***Zakah* (poor due) : Its significance, teachings & some basic rules:** (a) Definition and types (b) Importance (c) kinds of property on which *Zakah* is obligatory (d) Who should give *Zakah* (e) Due recipients of *Zakah* (f) *Zakah* and poverty alleviation (g) Impacts/ benefits of *Zakah*.	04	**CLO2 CLO4**
Chapter # 07	***Sawm* (Fasting): Its significance, teachings & some basic rules:** (a) Definition and types (b) Importance (c) Things which invalidate the fast (*Mufsidatus-Sawm*) (d) Who must fast? (e) Exemption from fasting (f) Recompense of mistake (*Qada'* and *Kaffarah*) (g) *SadqatulFitr/ ZakatulFitr* (h) Impact of *Sawm*. ***Hajj* (pilgrimage): Its significance, teachings & some basic rules:** (a) Definition and types (b) Importance (c) How to perform *Hajj* in detail? (d) Impact of *Hajj*.	04	**CLO4**

Chapter # 08	**Defense system of Islam:** (a) Definition and classification of *Jihad* from various aspects (b) Importance of *Jihad* (b) Differences between *Jihad* and Terrorism.	02	**CLO4**
		30	**1-7**

List of Books:

1- *Rafique Dr. Abu Bakr, Islam The Ultimate Religion (Book one) Islamic 'Aqidah', Chittagong: ABC Publications, 2002.*

২- Mohammad Amimul Ahsan and others, Towards Understanding *`Ibadah* in Islam, Bangladesh Institute of Islamicthought (BIIT), Humanscience Series-06, First Eddithion, May-2015.

Basic Principles of Islam (Pillars of *Iman*):

৩- *Bhuiyan, Mohammad ShafiulAlam, The Fundamental Beliefs of a Pure Muslim,* 1st edition, WAMY, Bangladesh office, Dhaka, 2003.

৪- *Sabiq, Assayed, Al-`Aqaeed Al- Islamiyah, Cairo, Al-Fathu Lil-IelamilArabi, 10th edition-2000.*

৫- *Bilal Philips, Dr. Abu Ameenah. The Fundamentals of Thwhid* (Islamic Monotheism), International Islamic Publishing House.

৬- *Farid, Ahmed, An Encounter with Islam, Dhaka: Islamic Foundation, BaitulMukarram, Dhaka, 1995.*

Basic Principles of Islam (Pillars of Islam):

৭- *Abdalati, Hammudah, Islam in Focus,* The Dept. of Islamic Affairs, The Ministry of *Awqaf* and Islamic Affairs, State of Qatar, 1995/ Islamic Teaching Course. Vol.-1

8- *Al-Quardawi, Dr. Yousuf, Al-'Ibadah in Islam,* Wahba publication, Etypt, 24th edition, 1995.

9- *Alkhuli, Muhammad Ali, The Light of Islam,* E 4, Riyadh: Al Farazdak Press, 1983.

10- *Sarwar, Ghulam, Islam: Beliefs and Teachings,* London: The Muslim Educational Trust, 1980.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the				

	semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

C. Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions

Power point Presentation,

D. Assessment tools: Class Attendance, Class test, Quizzes/ Assignment.

Mid-Term & Final Exam. Project evaluation & Viva

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Course Title: **History of Emergence of Bangladesh** **Credits**:03 **Contact**: 03
Course Code: **GEHE-2301** CIE Marks: 50
Exam Hours: SEE Marks: 50

Course Description: The course has been designed to study the dynamic and diverse movements of the people of Bangladesh to achieve its independence in 1971. The course, primarily, focuses on the rising of Bengali nationalism and the national identity crisis of the Bengali along with significant autonomous vibrations regarding changes in the politics of social dominance in the period –from appearance of united Pakistan to the emergence of Bangladesh as an independent country.

Course Learning Outcomes: At the end of the course, the students will be able to-

01.	Analyze the historical contexts and socio-political perspectives for the Independence movement of Bangladesh
02.	Appreciate the background and events of the glorious War of Liberation of Bangladesh
03.	Estimate the role of national leaders and political parties in the Independence movement of Bangladesh
04.	Evaluate the role of Bangabondhu Sheikh Mujibur Rahman as the founder and un-parallel leader of the Independence movement of Bangladesh.
05.	Uphold the spirit of liberation war resulting in the enhancement of patriotism.
06.	Contribute to building a non-communal, democratic and developed Bangladesh in the context of modern world.
07.	Appreciate any significant national issue in context of demand of time and future integrities.

SL NO	**CONTENT OF COURSE (as Summary)**	Hrs.	CLOs
01.	**Introduction to the country and its people:** Geographical features and their influence, ethnic composition, language, cultural syncretism and religious tolerance, distinctive identity of Bangladesh in the diverse context.	06	
02.	**Proposal for undivided sovereign Bengal and the partition of the Sub-Continent, 1947:** Rise of communalism under the colonial rule, Lahore Resolution 1940, The proposal of Suhrawardi and Sarat Bose for undivided Bengal: consequences, The creation of Pakistan 1947.	03	
03.	**Pakistan: Structure of the state and disparity:** Central and provincial structure, influence of military and civil bureaucracy, economic, social and cultural disparity.	06	
04.	**Language Movement and quest for Bengali identity:** The Language	03	

	Movement: context and phases, United Front: election of 1954, consequences, misrule by Muslim League and struggle for democratic politics, framing of the constitution of Pakistan in 1956.		
05.	**Military regimes of Ayub Khan and Yahya Khan (1958-1971):** Definition of military rules and its characteristics, Ayub Khan's rise to power and characteristics of his rule (Political repression, Basic democracy), Fall of Ayub Khan and Yahya Khan's rule (Abolition of one unit, universal suffrage, the Legal Framework Order).	03	
06.	**Rise of nationalism and the Movement for self-determination:** Resistance against cultural aggression and resurgence of Bengali culture, Student movement 1962, the six point movement: reactions, importance and significance. The Agartala conspiracy case 1968, Mass upsurge of 1969.	06	
07.	**Election of 1970 and the Declaration of Independence:** Election result and centres refusal to comply, The non-cooperation movement, the 7th March Address, Operation Search-light, Declaration of Independence and the arrest of Bangabondhu Sheikh Mujibur Rahman.	06	
08.	**The war of Liberation 1971:** Genocide and repression of people, Formation of Bangladesh government and proclamation of Independence, Formation of MuktiBahini, Publicity Campaign in the war of Liberation, Contribution of students, women and the masses, The role of super powers, The Anti-liberation activities, killing of the intellectuals, Trial of Bangabondhu and reaction of the World Community, The role of ArabWorld in the Liberation War, The role of India in the Liberation War, Formation of joint command and the Victory.	06	
09	**Immediate Development of Independent Bangladesh:** Homecoming of Bangabondhu, Making of the constitution, Reconstruction of the war ravaged country. Reign of Bangabandhu (1972-1975). Contribution of National leaders of Bangladesh: AK FazlulHuq, MaulanaVashani, Hussein ShahidSuhrawardi, Bangabondhu Sheikh Mujibur Rahman, Syed Nazrul Islam, Tajuddin Ahmed, HM Kamruzzaman, Captain M Mansur Ali, MAG Osmani.	06	

Text Book

1. Muntasir Mamun and Soumitra Shekhar, *Swadhin Bangladesher Obvyudyer Itihas*, (Dhaka: University Grand Commission-UGC, Bangladesh, 2017).
2. Rounaq Jahan, *Pakistan: Failure in National Integration*, (Dhaka: University Press Limited, 1977).

Reference Books:

1. Sirajul Islam (ed.), *Banglapedia: National Encyclopedia of Bangladesh*, Vol. 1-14, (Dhaka: Asiatic Society of Bangladesh, 2014).
2. Sirajul Islam (ed.), *BangladesherItihash,*Vol. 1-3, (Dhaka: Asiatic Society of Bangladesh, 2014).
3. Dr. Md. EmranZahan& Dr. Md. Siddiqur Rahman Khan, *BangladesherItihas 1972-2014*, (Dhaka: AbosarProkashanaSangstha, 2018).
4. Maidul Hasan, *Muldhara 71*, (Dhaka: The University Press Ltd., 1986).
5. Shamsul I. Khan, *Political Culture, Political Parties and the Democratic Transition in Bangladesh*, (Dhaka: The University Press Ltd., 2008).

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5

Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note : CIE=Continuous Internal Evaluation Marks, SEE= Semester End Examination Marks

Course Code: URED-2302 **Course Title: Sciences of *Qur'an* and *Hadith***
Credit Hours:1 **Contact Hours: 2 Contact Hours per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objective of the course: This course is designed to provide the students with proper knowledge and clear and comprehensive ideas regarding basic sciences of the *Qur'an* and *Hadith*, and to make them familiar with the purest sources of Islam and remove some misconceptions prevailing in the society concerning *Qur'an* and *Hadith* by establishing their authenticity and superiority. This course also inspires the students to enlighten their lives with the revealed knowledge of the *Qur'an* and *Hadith* in their practical lives.

Course outcome :

S/N	Course Learning Outcomes (CLOs): Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO1	know the status of Qur'anic verses and Hadiathic texts as well as they will get inspiration to establish the authenticity of the Holy Qur'an and Hadith.	IIUCMS-1	Cognitive/ Understanding
CLO2	developed ethically fulfilling their duties and responsibilities towards the Holy Qur'an and Hadith in their practical lives as ell as able to achieve the objective of the University in Islamization of Knowledge.	IIUCMS-3	Cognitive/ Applying
CLO3	establish the superiority of the Holy Qur'an understanding some extraordinary miraculous natures of the Holy Qur'an as well as able to differentiate between the genuine and fabricated Hadith and becoming aware of fabricated Hadiths prevalent in our society.	IIUCMS-2	Cognitive/ Analyzing

Section-A (Midterm Exam: 30 Marks)	Lecture	**CLOs**

Chapter # 01	**Sciences of *Qur'an*:** (1) Definition of the *Qur'an* Literally and Terminologically (2) Various Names and Attributes of the Holy *Qur'an* and their Significance (3) Characteristics of the Holy *Qur'an* (4) Central Subject Matter & the Main Themes of the Holy *Qur'an* (5) The necessity of the Holy *Qur'an* (6) The authenticity of the Holy *Qur'an*.	04	**CLO1**
Chapter # 02	***Wahi* (Revelation) of the Holy *Qur'an*:** (1) Meaning of *Wahi*(2) Various classifications and procedure of *Wahi*(3) Stages of revelation of the Holy *Qur'an* (4) Gradual revelation of the Holy *Qur'an* and the wisdom behind it (5) The First and the Last Revelation.	06	
Chapter # 03	**The *Ayah* and *Surah* of the Holy *Qur'an*: (1)** The *Aayah* of the *Qur'an*: Definition of *Aayah*. The Number of *Ayah*, words and letters of the Holy *Qur'an*. The Arrangement of the *Ayah* of the Holy *Qur'an***(2)** The *Surah* of The *Qur'an*: Definition of *Surah*. The Arrangement of *Surah* of the Holy *Qur'an.* The classification of *Surah* of the Holy *Qur'an*.	04	**CLO1** **CLO2**
Section-B (*SEE*: 50 Marks)		Hrs.	**CLOs**
Chapter# 04	***Makki*&*Madani*Revelations:** (1) The Definition of *Makki* and *Madani* (2) The Characteristics of *Makki* and *Madani* Revelations (3) The benefits of knowing *Makki* and *Madani* Revelations.	02	**CLO2**
Chapter# 05	**Preservation, Compilation &*Asbabunnuzul*(revelational background):** (1) Preservation & Compilation of the Holy Qur'an (2) The Causes of Revelation (*Asbabunnuzul*): The Definition of *Asbabunnszul*. The classification of *Asababunnuzul*. The benefits of Knowing *Asbanunnuzul.*	04	**CLO2** **CLO3**
Chapter# 06	***Al-Nasikh* (Abrogation) &*I'jaz* (inimitability) of The *Qur'an*:** **(1) Abrogation (*Al-Nasikh*) in the Holy *Qur'an*:** Definition of *Naskh.* The proofs of *Naskh.* The Classifications of *Naskh.* The benefits of knowing *Nasikh*(abrogating) and *Mansukh* (abrogated) verses. **(2) The Miraculous Nature of The Qur'an (*I'jaz Al-Qur'an)***: Definition of *I'jaz*. The Proofs of *I`jaz.* Various aspects of *I`jaz Al-Qur'an.*	04	
Chapter# 07	**Sciences of Hadith:** (1) Definition of *Sunnah* (2) Difference among *Qur'an, Sunnah* and *Hadith Qudshi* (3) The Position, importance and authority of *Sunnah* in Islamic *Shari'ah* (4) Explanation of some important terms of *Sunnah: Isnad/ Sanad, Matn, Rawee* and *Riwayah, Al-jame', Al-Musnad, Al-Sahih, Al-Sunan, Sahihayn, Muttafaqun 'Alayh, Al-kutub As-Sittah*…etc. (5) Collection & Compilation of *Sunnah.*	04	**CLO3**
Chapter# 08	**The classification of *Hadith* and fabrication in *Hadith*:** **(1) The classification of *Hadith*:** (a)According to the reference to a particular authority (b) According to the links in the *Isnad*(c) According to the number of narrators involved in each stage of the *Isnad*(d) According to the reliability and memory of the narrator. **(2) Fabrication in *Hadith*:** (a) Definition of Fabrication (b) Causes and consequence of fabrication (c) Some examples of commonly used fabricated *Hadith* in our society.	02	**CLO2** **CLO3**
		30	

List of Books

Sciences of *Qur'an*:

1. Denffer, Ahmad, vol. *'UlumAl-Qur'an:An Introduction to the Sciences of the Qur'an,* The Islamic

Foundation, UK, reprinted by – A.S. Noordeen, Kuala Lumpur. 1983.
2. Ushama, Dr. Thameem, *Sciences of the Qur'an: An Analytical Study,* International Islamic University Malaysia, Cooperative Limited, Kuala Lumpur. 1998.
3. Bucaille, Dr. Maurice, *The BibleThe Qur'an & Science*, Thinkers Library, Selangor DarulEhsan. Malaysia, 1996.
4. Badruddin Muhammad bin Abdullah Al-Badruddin Al- Zarkashi, *Al-Burhan Fi Ulumil Qur'an,* Dar Al-Marifah, Bairuth, Vl. 01.
5. *A Study of the Holy Qur'an and its Teachings*, First edition, IQRA International Education Foundation, Chicago, April-1999.

Sciences of *Hadith*:

1. Al-Azami, Dr Mohammad Mustafa, *Studies in Early Hadith Literature*, American Trust publication, Indiana, 1978.
2. Hasan, Dr. Suhaib, An Introduction to the Science of *Hadith*, London, *AL-Qur'an* Society, 1994.
3. Marhribi, Al-Hassan, Introduction to the Study of the *Hadith*, Roshmee, South Africa, Roshmee Islamic School, 1994.
4. Salih, Muhammad Adeeb, Lamahat fee Usul al-Hadeth, Damascus, 1393 AH.
5. Siddiqi, Muhammad Zubayr, Hadith Literature: its Origin, Development & Special Features, Cambridge, Islamic Texts Society, 1993.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		**Evaluations out of 100 marks**			
		CIE (50 marks)			**SEE (50 marks)**
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	5	-	-	05
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation ,**SEE**= Semester End Examination .

A. Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions

Power point Presentation,

B. Assessment tools: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term & Final Exam.

Project evaluation & Viva

Course Code: URED- 2305. **Course Title: Comparative Religion**
Credit Hours: 3 **Contact Hours: 3 Contact Hours per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objective of the Course: The objective of the course is to understand the central beliefs and concepts of major living religious traditions of the world, including Hinduism, Buddhism, Judaism, Christianity, and Islam.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO-1	demonstrate familiarity with the structure and ritual life of religious communities, including significant holidays and rituals.	**IIUCMS-1**	Cognitive/ Understanding
CLO-2	understand the methodology of the study of religion and develop skills in critically analyzing religion and comparing particular aspects of religious traditions.	**IIUCMS-2**	Cognitive/ Analyzing
CLO-3	develop skills in reading source texts as documents of religious life as well as develop skills in observing and critically analyzing religion in the contemporary world.	**IIUCMS-3**	Cognitive/ Understanding
CLO-4	aware of how to decrease Islam phobia among the non-Muslim community and increase mutual relationship among them.	**IIUCMS-1**	Cognitive/ Understanding

Content Outlines		
	Section-A (Midterm Exam: 30 Marks)	**CLO**
Chapter# 01 (3 lectures)	**Concept of religion:** a) Definition of religion. b) Significance, necessity and characteristics of religion. c) Approaches to the study of religions (Historical, Anthropological, Sociological, Philosophical and Phenomenological etc.).	CLO-1
Chapter# 02 (Six lectures)	**Origin and Development of Major Religions:** a) Basic history of major religions (Judaism, Christianity, Hinduism, Buddhism and Islam). b) Founders and profounder of religions.	
Chapter# 03 (3 lectures)	**The Features of Major Religions and Holy books and Sacred Texts:** a) The distinguishing features of major religions (Judaism, Christianity, Hinduism, Buddhism and Islam). b) Holy books and sacred texts of major religions.	CLO-2
Chapter# 04 (Nine lectures)	**The Comparative study of God in major religions:** a) Concept of God in Judaism. b) Concept of God in Christianity. c) Concept of God in Hinduism. d) Concept of God in Buddhism. e) Concept of God in Islam.	
	Section-B (SEE : 50 Marks)	
Chapter# 05 (Six lectures)	**Religious rituals, festivals and Holy places:** a) Rituals of major religions. b) Festivals of major religions. c) Holy places of major religions.	CLO-3
Chapter# 06 (3 lectures))	**The Comparative study of religious mentors and prophets in major religions:** a) Necessity of Prophets and Spiritual guides for human life. b) Comparative study of prophecy and religious mentorship in famous religions.	
Chapter# 07 (Six lectures)	**The Comparative Study of Life after Death in major religions:** a) Concept of Death in different religions. b) Concept of the Day of Judgment in different religions.	

	c) Concept of Heaven and Hell in different religions. d) Concept of Reward and Punishment in different religions.	
Chapter# 08 **(**3 lectures)	**The understanding of Man and Universe in major religions.** a) The purpose of Human being in different religions. b) The purpose of the Universe.	CLO-4
Chapter# 09 **(**Nine lectures)	**The common values in major religions:** a) Ethics and Morality. b) Evil. c) Justice. d) Destiny and Luck. e) Religious diversity. f) Non-violence and Peaceful co-existence. g) Harmony and Interfaith dialogue. h) Social Justice and Human Ideological rights.	
References:	Sharpe, E. J. (1989). Comparative religion: A history. Eliade, M. (1996). *Patterns in comparative religion* of Nebraska Press. Eastman, Roger (1999) *The Ways of Religion: An Introduction to the Major Traditions.* Oxford University Press, US; 3 editions.	

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		**Evaluations out of 100 marks**			
		CIE (50 marks)			**SEE (50 marks)**
Cognitive learning	Affective Learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination.

A. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions

Power point Presentation,

B. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment.Mid-Term & Final Exam. Project

evaluation & Viva

Course Code: URBL2401 **Course Title: Functional Bengali Language**
Credit hours:2 **Contact hours: 2 contact hours per week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Course Description: মাতৃভাষার আকর্ষন দুর্নিবার। বাংলা আমাদের মাতৃভাষা এবং এটি বাংলাদেশের রাষ্ট্রভাষার মর্যাদায় অধিষ্ঠিত আছে। শিড়্গার্থীদের ভাষাগত দড়্গতা অর্জনের জন্য কোর্সটিতে বাংলা ব্যাকরনের প্রয়োজনীয় বিষয়সমূহের সমন্বয় করা হয়েছে। বাংলা ভাষা ও সাহিত্যের ইতিহাস, বাংলা সাহিত্যের প্রথিতযশা সাহিত্যিকদের গুরম্নত্বপূর্ণ কিছু সাহিত্য কর্ম সংযুক্তির মাধ্যমে কোর্সটিকে সময়োপযোগী ও ভারসাম্যপূর্ণ করা হয়েছে।

কোর্সটির উদ্দেশ্য হচ্ছে বাংলাভাষা ও বাংলা ব্যাকরণের গুরম্নত্বপূর্ণ নিয়মাবলী সম্পর্কে শিড়্গার্থীদের স্পষ্ট ধারণা প্রদান করা। কোর্সের অন্তর্ভূক্ত বর্ণ, ধ্বনি, শব্দ, বাক্য, বানানের নিয়ম, পরিভাষা, প্রতিবর্ণীকরণ, সমাস, প্রকৃতি-প্রত্যয়, এবং আরো অন্যান্য বিষয় সমূহের পাঠদানের মাধ্যমে শিড়্গার্থীদের মৌখিক এবং লৈখিক ড়্গেত্রে ভাষার বিশুদ্ধতা অর্জনে সড়্গাম করা। বাংলা ভাষা ও সাহিত্যের ইতিহাস ও সাহিত্যের ক্রমবিকাশ সম্পর্কে অবগত করা । বাংলা সাহিত্যেও বিভিন্ন আঙ্গিক ও গুরম্নত্বপূর্ণ কিছু সাহিত্যের বিদ্যায়তনিক পাঠের মাধ্যমে শিড়্গার্থীদের উদার নৈতিক করে গড়ে তোলাও কোর্সটির অন্যতম একটি উদ্দেশ্য।

Course Learning Outcomes: At the end of the course, the students will be able to-

CLO1	শিক্ষার্থীরা বাংলা ব্যাকরণের নিয়মগুলো অধ্যয়নের মাধ্যমে শুদ্ধভাবে বাংলা বলা ও লেখার যোগ্যতা অর্জন করবে।
CLO2	বাংলা লেখার ক্ষেত্রে শুদ্ধ বানান প্রয়োগে শিক্ষার্থীরা সমর্থ হবে।
CLO3	শিক্ষার্থীরা বাংলা শব্দের উচ্চারণ প্রণালি সম্পর্কে অবগত হবে এবং শুদ্ধ উচ্চারণে সক্ষম হবে।
CLO4	শিক্ষার্থীরা বাংলা সাহিত্যের বিভিন্ন আঙ্গিকের (কবিতা, প্রবন্ধ, ছোটগল্প) স্বরূপ উপলব্ধি করতে পারবে।
CLO5	বাংলা সাহিত্যও ইতিহাস (প্রাচীন, মধ্য ও আধুনিকযুগ),সাহিত্যেও যুগ বিভাগ ও সাহিত্যের ক্রমবিকাশ সম্পর্কে শিড়্গার্থীরা স্পষ্ট ধারণা অর্জন করবে।
CLO6	বাংলা সাহিত্যের প্রথিতযশা সাহিত্যেক ও তাদের উলেস্নখযোগ্য সাহিত্যকর্মের সাথে শিক্ষার্থীরা পরিচিত হতে পারবে।

CLO7	কোর্সটি অধ্যয়নের মাধ্যমে শিক্ষার্থীরা সৃজনশীল লেখায় অভ্যস্ত্ম হতে পারবে।

SL NO	**CONTENT OF COURSE**	Lecture	**CLOs**
01.	বাংলা ভাষার উদ্ভব ও সাধারণ পরিচয়: ভাষার সংজ্ঞা, ভাষার ইতিহাস, বাংলা ভাষার উদ্ভব ও ক্রমবিকাশ।	03	**CLO1**
02.	বাংলা বর্ণ ও ধ্বনি পরিচয়: সংজ্ঞা, বর্ণ ও ধ্বনির সম্পর্ক, বর্ণ ও ধ্বনির উদাহরণসহ আলোচনা।	02	**CLO2**
03.	বাংলা বানান: ণ-ত্ব বিধান, ষ-ত্ব বিধান ও প্রমিত বাংলা বানানের নিয়ম: সংজ্ঞা, উদাহরণসহ বাংলা বানানের নিয়ম আলোচনা।	04	**CLO3**
04.	পরিভাষা: সংজ্ঞা, ইতিহাস, প্রয়োজনীতা ও উদাহরণ।	02	**CLO4**
05.	শব্দ: সংজ্ঞা, প্রকারভেদ ও উদাহরণ।	03	**CLO4 CLO7**
06.	বাক্য: সংজ্ঞা, প্রকারভেদ, গঠন কৌশল ও উদাহরণ।	04	**CLO4 CLO5**
07.	প্রতিবর্ণীকরণ: নিয়ম আলোচনা।	02	**CLO5 CLO6**
08.	সমাস ও প্রকৃতি-প্রত্যয়: সংজ্ঞা, প্রয়োজনীয়তা, প্রকারভেদ ও উদাহরণ।	04	**CLO5 CLO6**
09	সারাংশ, সারমর্ম, ভাবসম্প্রসারণ, পত্রলিখন: সংজ্ঞা, প্রায়োগিক আলোচনা।	03	**CLO5 CLO6**

Reference Books:

১. বাঙ্গালা ভাষার ইতিবৃত্ত: মুহাম্মদ শহীদুলস্নাহ।
২. বাঙ্গালা ব্যাকরণ: মুহাম্মদ শহীদুলস্নাহ।
৩. বাংলা উচ্চারণ অভিধান: নরেন বিশ্বাস।
৪. বাংলা ভাষার ব্যাকরণ: জ্যোতি ভূষণ চাকী।
৫. বাংলা বানানের নিয়ম: মাহবুবুল হক।
৬. প্রমিত বাংলা বানানের নিয়ম: বাংলা একাডেমী।
৭. বাংলা বানান সংস্কার: সমস্যা ও সম্ভাবনা: পবিত্র সরকার।
৮. অভিধান: মোহাম্মদ আব্দুল কাইয়ুম।
৯. গল্পগুচ্ছ: রবীন্দ্রনাথ ঠাকুর।
১০. প্রবন্ধ: কাজী নজরুল্ল ইসলাম।

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5

Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination

A.Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

B.Assessment tools: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term & Final Exam. Project evaluation & Viva

International Islamic University Chittagong (IIUC) COURSE OUTLINE		
Course Code	**URBL-2401**	
Course Title	**Bengali Language and Literature**	
Status	**University Requirement**	
Level	**4**	
Credit Hours	**2**	
Contact Hour	**2**	
Course Assessment	**Attendance & Class test/Assignment**	**10% + 10% = 20%**
	Mid-term Examination	**30%**
	Final Examination	**50%**
Objective	The objective of this course is to enlighten the learners with a comprehensive skill on Bangla Language with emphasis on correct sound system; pronunciation skills; the IPA system; problem sounds; vowels; consonant and diphthongs; lexical and syntactic stress and all other grammatical rules for interpersonal communication and the interpretation and production of the language in written and oral forms. This course examines the history and developments of Bengal literature with the contributions of prominent literate personalities to the development of Bangla language and literature from early age to modern time.	
Content	**প্রায়োগিক বাংলা: ৫০** ১. বাংলা ভাষার উদ্ভব ও সাধারণ পরিচয়। ২. বাংলা বর্ণ ও ধ্বনি পরিচয়। ৩. বাংলা বানান: ণ-ত্ব বিধান, ষ-ত্ব বিধান ও প্রমিত বাংলা বানানের নিয়ম। ৪. শব্দ প্রকরণ।	

	৫. সমাস ও প্রকৃতি-প্রত্যয়। ৬. বাক্য প্রকরণ। ৭. পরিভাষা। ৮. প্রতি বর্ণীকরণ (ওচঅ) পরিচিতি। ৯. সারাংশ, সারমর্ম, ভাবসম্প্রসারণ। ১০.পত্রলিখন। **বাংলা সাহিত্য: ৩০** ১. বাংলা সাহিত্যেও ইতিহাস (প্রাচীন, মধ্য ও আধুনিক যুগ) ২. গদ্য: (ক) পোস্ট মাস্টার, মুসলমানী গল্প (রবীন্দ্রনাথ ঠাকুর) (খ) তরুন্নের সাধনা, যৌবনের গান (কাজী নজরুল ইসলাম) ৩. কবিতা: (ক) বঙ্গ ভূমির প্রতি (মধুসূদন দত্ত) (খ) সোনার তরী (রবীন্দ্রনাথ ঠাকুর) (গ) সাম্যবাদী (কাজী নজরুল ইসলাম) (ঘ) আজান (কায়কোবাদ) **Midterm Exam: 30 Marks** **প্রায়োগিক বাংলা: ২০** ১. বাংলা ভাষার উদ্ভব ও সাধারণ পরিচয়। ২. বাংলা বর্ণ ও ধ্বনি পরিচয়। ৩. বাংলা বানান: ণ-ত্ব বিধান, ষ-ত্ব বিধান ও প্রমিত বাংলা বানানের নিয়ম। ৪. পরিভাষা **বাংলাসাহিত্য : ১০** ১. গদ্য: (ক) পোস্ট মাস্টার, মুসলমানী গল্প (রবীন্দ্রনাথ ঠাকুর) (খ) তরুন্নের সাধনা, যৌবনের গান (কাজী নজরুল ইসলাম) **Final Exam:50 Marks**

	প্রায়োগিক বাংলা: ৩০ ১. শব্দপ্রকরণ। ২. সমাস ও প্রকৃতি-প্রত্যয়। ৩. বাক্য প্রকরণ। ৪. প্রতি বর্ণীকরণ (ওচঅ) পরিচিতি। ৫. সারাংশ, সারমর্ম, ভাবসম্প্রসারণ। ৬. পত্রলিখন। **বাংলাসাহিত্য: ২০** ১. বাংলা সাহিত্যের ইতিহাস (প্রাচীন, মধ্য ও আধুনিক যুগ) ২. কবিতা: (ক) বঙ্গভূমির প্রতি (মধুসূদন দত্ত) (খ) সোনারতরী (রবীন্দ্রনাথ ঠাকুর) (গ) সাম্যবাদী (কাজী নজরুল ইসলাম) (ঘ) আজান (কায়কোবাদ)
Learning Outcome:	By studying this course the learners will be able to adopt the principle structures of Bangla language in a systematic and coherent manner and, at the same time, make reading and articulation, pronunciation, spelling knowledge, vocabulary, and linguistic skills and tools that are needed to work and succeed in the language. The students will also be able to estimate the successive development of Bangla language and literature, and students will learn specialized Bangla in academic terminology and acquire the language skills needed to understand and discuss, in speaking and writing, topics within a professional environment.
Reference:	১. রবীন্দ্রনাথ ঠাকুর, গল্পগুচ্ছ, বিশ্বভারতী, কলকাতা। ২. কাজী নজরুল ইসলাম, অগ্নিবীনা, সর্ব্বহারা, সঞ্চিতা, ইসলামী কবিতা, গজল ও প্রবন্ধ এবং কাব্য, আমপারা। ৩. মুহাম্মদ শহীদুলস্নাহ, বাঙ্গালা ভাষার ইতিবৃত্ত, শহীদুলস্না রচনাবলী ৩য় খন্ড, বা.এ. ঢাকা- ১৯৯৫। ৪. মুহাম্মদ শহীদুলস্নাহ, বাঙ্গালা ব্যাকরণ, ঐ। ৫. নরেন বিশ্বাস, বাংলা উচ্চারণ অভিধান, বা.এ.। ৬. জ্যোতিভূষন চাকী, বাংলা ভাষার ব্যাকরণ, কলকাতা, আনন্দ পাবলিকেশন,

	১৯৯৬। ৭. মাহবুবুল হক, বাংলা বানানের নিয়ম। ৮. প্রমিত বাংলা, বানানের নিয়ম। ৯. ড. মো: মাছউদুর রহমান, বাংলা ভাষায় ইসলামী সাহিত্য চর্চা- পি.এইচ.ডিথিসিস, ঢাকা বিশ্ববিদ্যালয়। ১০.আ: মান্নন সৈয়দ- কাজী নজরম্নল! কবি ও কবিতা।

Course Code: URED-3503. **Course Title: Political Thoughts and Social Behavior**
Credit Hours: 1 **Contact Hours: 2 per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives of the Course: Following are the Objectives of the course::

i. To help the students demonstrate an in-depth understanding of their real position in this temporary world.
ii. To understand their relation with the state and society.
iii To help them in performing their duties and responsibilities towards their state, society and humanity at large.

S/N	**Course Learning Outcomes (CLO)**: Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO 1	Understand the nature of worldly life and the real position of human being here and learn the techniques of dealing their lives in the light of Quran and Sunnah.	IIUCMS-2	Cognitive/ Understanding
CLO 2	Understand the basic principles of various parts of social science and their usages to achieve the main purpose of the life and apply the different models for evaluating the real life concerned performance	IIUCMS-1	Cognitive/ Understanding
CLO 3	Understand the social relationship through understanding the family, kinship, neighborhood and other general relationship based on Qur'an and Sunnah as well as dealing with a fellow human being positive to ensure peace in their practical lives.	IIUCMS-3	Cognitive/ Applying

Course Content
Section A: Mid-Term Examination - 30 Marks

Chapter 01	L 01	Politics	Literal and terminological meaning
	L 02 L 03	Basic Principles of Islamic Political System	Sovereignty of Allah, *Khilafa* of mankind, Legislation by *shura* Accountability of the government, Independency of the judiciary and Equality before law
Chapter 02	L 04	*Shariah*	Its meaning, sources and differences with manmade law
	L 05 L 06 L 07 L 08	Constitution	Definition, Contents and sources Main features of Islamic constitution 1. Supremacy of *Shari'ah* 2. Administration through consultation 3. All wealth belonged to Allah 4. Citizen share their property for the well-being of their fellow human being 5. It acts as mouthpiece of government 6. Role of Public media is for the interest of Muslim and Islam 7. The Government is savior of distress and oppressed people 8. Government is duty bound to produce basic needs 9. The government is guardian for building of good character 10. It produces Allah fearing and hereafter faced citizen
Chapter 03	L 09	State and Government	Definition and Elements of state, What is government? What does government do? Different types of government, how did government develop, relationship between government and state
	L 10 L 11 L12	Basic organs of government	Executive (Head of the state) Legislative and *Shura* Judiciary
Chapter 04	L 13	Citizen and citizenship	Meaning, Types, Rights and duties of citizens
	L 14	Conventional Political System and Islam	Capitalism Socialism Secularism Democracy and Islam

Section B: **SEE** (50 Marks)

Chapter 05	L 15 L 16	Introduction to Social Dealings and Behavior in Islam	1. Definition of *Mu'amalah* as Islamic term of Dealings and Behavior 2. Scope of *Mu'amalah* (Dealings and Behavior) 3. Different aspects of Mu'amalh : Social and Economic.
Chapter 05	L 17 L 18 L 19 L 20 L 21	Dealings and Behavior of a man relating to himself and his Family: (*Mu'amalah al Usariyyah*)	1. Status and dignity of a man according to Qur'an and Sunnah 2. Behavior of a man with himself as a vicegerent of Allah 3. Role of family as the basis of Islamic society 4. Role of Marriage as the basis of Islamic Family 5. Status of women in Islam, comparison with other religion 6. Rights and duties of women in Islam 7. Husband-wife relations (Duties and obligations to each other) 8. Rights of Children in Islam 9. Parent child relationship
Chapter 06	L 21 L 22 L 23 L 24 L 25	Dealings and Behavior of a man with his society	**(a) Social duties and obligations:** (1)Duty towards Parents, (2) Relatives, (3) Neighbors (4) Guests, (5) Needy and (6) Orphan. (7) Duties of the Muslims to each other. **(b) Social Manners:** (1) Brotherhood (2) Greetings (3) Co-operation (4) Meetings (5) Talking (6) Keeping promises (7) Asking permission before entering someone's house. **(c) Basic virtues that every member of a society should bear:** (1) Honesty (2) Truthfulness (3) Kindness (4) Perseverance (5) Firmness against evil (6) Tolerance (7) Punctuality (8) Courage (9) Trust worthiness (10) Forgiveness (11) Chastity for women (12) Intention (13) Promise (14) Modesty (15) Charity (16) Gifts (17) Thankfulness (18) Visiting the sick. **(d) Bad Conduct and Prohibitions that every member of a society should avoid:** (1) Lying (2) Backbiting (3) Spying (4) Extravagance (5) Hypocrisy, and (6) Corruption … etc.
Chapter 07	L 26	Islamic Law regardingDress both for man and woman	Islam does not recommend any particular type of dress for us. However, there are guidelines Islam asks us to look nice and decent. Allah has created man in the best of forms and He wants his servants to dress nicely and decently. We should bear in mind that we are the best of all creatures and our dress should reflect this. Proper dress helps prevent indecency, immoral behavior, and adds beauty to our personality

Chapter 08	L 27	Principles of permissibility and prohibition in Islam	a) All things are lawful except what have been prohibited explicitly by Allah and by His messenger. b) Only Allah has the right to declare a thing lawful or prohibited c) The means or causes that lead to unlawful action are also prohibited. d) What is prohibited is prohibited for all. e) A grave necessity legalizes temporarily an illegal thing.
	L 28	Permissibility and Prohibition in food and drinking	a) The principle of Moderation b) What not to Eat c) Submission to Allah d) What not to Drink e) The Need for Allah's Guidance
Chapter 09	L 29	Economic System of Islam: (*Mu'amalah al Maliyah*)	1. Earning and expenditure by *Halal* means 2. Right to own property and individual liberty 3. System of *Zakah* 4. Prohibition of interest (*Riba*) 5. Law of Inheritance (*Mirath*)
	L 30	Festivals in Islam	*Eid al Fitr, Eid al Adha*

Books list:

References:

1. Bhuiyan, Mohammad ShafiulAlam (2007), *The Government and Politics in Islam*, Dhaka: Noor Publications.
2. Hamid, E. A. (2004). *The Qur'an and Politics*, London: International Institute of Islamic Thought.
3. Islam, A. B. M. M. (2005). *Islamic Constitution: Quranic and Sunnatic Perspectives*.
4. A'LaMaududi, S. A. (1980). *The Islamic Law & Constitution*: Islamic Books.
5. Sarwar, G. (1982). *Islam, beliefs and teachings*: Muslim educational trust.
6. Hannan, S. A. (2017). *Social Laws of Islam*. Dhaka: Bangladesh Institute of Islamic Thought (BIIT)
7. Zino, Muhammad bin Jamil, *Islamic Guidelines,*Darusalam, Riyadh, 1996.
8. Al-Qaradawi, Y. (1988). *Halal and Haram in Islam*.
9. Ahmad, M. (2009). *Business ethics in Islam*: International Institute of Islamic Thought (IIIT).
10. Chapra, M. U. (2016). *The future of economics: An Islamic perspective* (Vol. 21): Kube Publishing Ltd.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category	Evaluations out of 100 marks	
	CIE (50 marks)	SEE (50 marks)

Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination.

i. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

ii. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment.Mid-Term & Final Exam. Project evaluation & Viva

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Course Code: URED- 3604. Course Title: Life and Teachings of Prophet Muhammad (SAAS)
Credit Hours: 1 **Contact Hours: 2 Contact Hours per Week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objective of the Course: This *course* is designed to provide information to the stuents about the Early life of Prophet (SAAS) , Islamic Movement at Makkah, Hijrah of the Prophet (SAAS), Construction of the Mosque, Important Battles, The Farewell Address of the Prophet (SAAS) and its lessons.,

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO-1	develop an in-depth study for clear understanding of the last Prophet's life, mission and teachings.	IIUCMS-1	Cognitive/ Understanding
CLO-	understand that the Prophet Muhammad (SAAS) is	IIUCMS-2	Cognitive/

2	only ideal mentor to follow by the entire humanity.		Understanding
CLO-3	familiarize with the exalted characters, manners, habits and behaviors of our beloved Prophet (SAAS) in order to emulate it in their practical life.	IIUCMS-3	Cognitive/ Applying

Course Content

Section-A (Midterm Exam: 30 Marks)			
		Lecture	CLOs
Chapter # 01	**An introduction to *Siratunnabi*(SAAS):** A comprehensive view, *Sirah* and its literally and technical meaning, Selection of Arabia as the birthplace of the Final Prophet *(SAAS)*, Socio-Political, Religious condition of pre-Islamic Arabia: an Overview.	04	CLO 1
Chapter # 02	**Early life of Prophet (SAAS):**Birth and Childhood, Business trip to Syria with his uncle *Abu Talib*, Battle of *Fujjar* and formation of *Hilful-Fudul*, Contribution of Mohammad (SAAS) in the business of Khadijah, Marriage with Khadijah, Rebuilding of *Al-Ka'bah*, Search for the truth and receiving the truth.	05	
Chapter # 03	**Beginning of Islamic Movement at *Makkah*:** (From first revelation to the emigration to Abyssinia): Prophethood, First revelation and its impact. Propagation of Islam Begins in secret, The early Muslims, End of the First Phase.Islamic Movement becomes public, The Prophet on the Mount of *Safa*. Oppositions from the Quraysh begin, Qur'anic approach towards Quraysh Oppositions. Migration to Abyssinia.	05	CLO 2
Section-B (*SEE*: 50 Marks)			
Chapter # 04	Prophet *(SAAS)* at *Makkah*: (From emigration to Abyssinia to the migration to *Madinah*)-: Boycott and Confinement of the Prophet (SAAS) and BanuHashim by the Quraysh, The year of sorrow.	02	CLO2
Chapter # 05	*Ta'if*- the most difficult day, *Mi'raj* of the Prophet. Covenants of *Al-'Aqabah*. *Hijrah* of the Prophet (SAAS).	02	
Chapter # 06	The Prophet (SAAS)at *Madinah*: (From migration to *Hudaybiyah*): Construction of the Mosque, The Charter of Madinah, Important Battles till the agreement of *Hudaybiyah*- The Battle of *Badr*, The Battle of *Uhud*, Battle of *Ahzab*, Campaigns against the Jews of *Madinah*, *Hudaybiyah* Agreement.	04	
Chapter # 07	Letters of the Prophet (SAAS) to the kings beyond Arabia, Battle of *Muta*, Battle of *Hunayun*, The conquest of *Makkah*.	04	CLO3
Chapter # 08	The Farewell Pilgrimage, The Farewell Address of the Prophet (SAAS) and its lessons, Departure of the Prophet (SAAS), Contributions of the Prophet (SAAS) as a reformer and as a nation builder and as an Ideal for the all.	04	

List of Books:

1. Nadwi, SaiyidSulaiman, *Muhammad The Ideal Prophet: A Historical, Practical, Perfect Model for Humanity*. Translated by Mohiuddin Ahmad. Islamic Book Trust K.L.N.D.

2. Guillaume, Alfred. *The Life of Muhammad: A Translation of IbnIshaq'sSiratRasul Allah.* London: Oxford University Press, 1955.

3. Lings, Martin. *Muhammad: his life based on the earliest sources.* New York: Inner Traditions International, 1983.

4. Nasr, SeyyedHossein, *Muhammad: Man of God.* Chicago, IL: Kazi Publ., 1995.

5. Ramadan, Tariq. *In the Footsteps of the Prophet: Lessons from the Life of Muhammad.* New York: Oxford University Press, 2009.

6. Watt, William Montgomery. *Muhammad: Prophet and Statesman.* London: Oxford University Press, 1961.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		**Evaluations out of 100 marks**			
		CIE (50 marks)			**SEE (50 marks)**
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	5	-	-	05
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	X	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

.**Note: CIE**=Continuous Internal Evaluation, **SEE**= Semester End Examination.

A. Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions

Power point Presentation,

B. Assessment tools: Class Attendance, Class test, Quizzes/ Assignment.

Mid-Term & Final Exam. Project evaluation & Viva

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Course Code: URIH-4701 Course Title: A Survey of Islamic History & Culture
Credit Hours: 1 Contact Hours: 2 contact hours per Week

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Course Objective: The course has been designed for undergraduate students get squinted with the glory of Islamic history and then appreciate the incredible contribution of Islamic culture to

the modern world.The course also offers detailed knowledge of Islam's political, socio-economic, and cultural history from the 7th to 15th centuries with science and learning innovations in various Muslim world territories. This would also deepen students' understanding of the dynamic interconnection between Islamic history and culture and other civilizations.

Course Learning Outcomes: At the end of the course, the students will be able to-

S/N	**Course Learning Outcomes (CLOs)**: Upon the successful completion of the course, students will be able to:	Corresponding IIUC Mission	Bloom's taxonomy domain/level
CLO-1	understand with a clear concept regarding institution of *Khilafah*with its major developments across the Muslim world since the twentieth century together with knowledge of different forms of government structure and functions throughout history.	IIUCMS-1	Cognitive/ Understanding
CLO-2	familiar with the glorious chapter of Four Pious *Khalifah*in Islam which analyzes the impact of time on the progress of good governance globally.	IIUCMS-1	Cognitive/ Analyzing
CLO-3	achieve a detailed idea about extending the Islamic world beyond Asia, Europe and African territories from the time of the prominent Muslim rulers, the learners will; they will also understand impressive reforms towards advancement of world civilization.	IIUCMS-2	Cognitive/ Understanding
CLO-4	analyze the rise and the wonderful contribution of various Islamic forces, Islamic religious institutions and sects from the Middle East and North African region to global culture; be able to recognize the wonderful contribution of various Islamic people in scientific and technological advances in the world civilization.	IIUCMS-3	Cognitive/ Analyzing
CLO-5	recognize the extensive administration feature with many notable developments in administrative functions and an ability to notice the development of the parliamentary system in Islamic State; taxation and other administration of revenue that was governed solely for public welfare.	IIUCMS-3	Cognitive/ Understanding

Section-A (Mid-term: 30 Marks)

1. The concept of knowing history and Islamic history, the importance of history and Islamic history for life and society, its needs for cultural and civilization growth.

2. Definition, Origin and Development of *Khilafah*;Types of *Khilafah*; Election system to the office of *Khilafah*; *Khilafah* and *Mulukiyyah*; Qualifications, Duties and Responsibilities of a *Khalifah.*

3. **Introduction to the Four Pious *Khalifah*:** Abu Bakr (R), Umar (R), Uthman (R) and Ali (R). Achievements and Contributions of the Pious *Khalifah*. Comprehensive study of the historical events during four pious *Khalifah.*
4. **Administration under the Four Pious *Khalifah*:**The *Shura*, Civil Administration, Revenue System, Central state treasury, Judicial Administration, Police-Prison, Religious Administration and Military Administration.

Section-B (SEE: 50 Marks)

5. **The Umayyads*Khilafah* (661 A.D-750 A.D):** A brief introduction to Umayyads*Khilafah.* Central and Provincial Administration, Social Condition. Umayyads contribution towards the development of civilization & education, and Fall of the Umayyads.
6. **The Abbasids *Khilafah* (750 A.D-1258 A.D):** Golden Age of the Abbasids. Abbasids Society, Rights of Women and non-Muslims in the state; Scientific and Literary development, Advancement of Art and Architecture. Total Administrative features, and Fall of Baghdad.
7. A Brief Analysis on the Umayyads*Khilafah* of Spain and Fatimids*Khilafah* of Egypt and North Africa.
8. **Muslim contribution to different fields of civilization:**Geography; Medical Sciences and Medicine; Chemistry, Mathematics; Astronomy; Historiography; Art and literature; and Painting and Calligraphy.
9. The development of Islamic Theological Institutions and Sects; *Sunni* Schools of Islamic law, Theological communities with philosophical advancement.

Text Book

P.K. Hitti, History of the Arabs, Macmillan edition, 1970, London.
K. Ali, A Study of Islamic History, Adam Publishers & Distributors, 2006, Dhaka.
MofizullahKabir, An Outline of Islamic History, Dhaka.

Reference Books:

S.A.Q. Hussaini, The Arab Administration, 1956, Lahore.
SyeedAmeer Ali, A Short History of Saracens, Macmillan edition, 1916, London.
T.I. Arnold, The Caliphate, Oxford, 1924, London.
Muhammad Ali, The Early Caliphate, Cambridge, 1936, London.
R. Levy, The Social Structure of Islam, Cambridge 1979, London.
R.A. Nicholson, A Literary History of the Arabs, Cambridge 1930, London.
S.M.Imamuddin, Arab Muslim Administration, 1976, Karachi.
S. KhudaBaksh, Islamic Civilization, vol 1-2, IdaraIslamiyat-e-Diniyat, or KitabBhavan, 1984, Delhi..
R.H.Turner, Science in Medieval Islam: An Illustrated Introduction. 1995, Austin: University of Texas Press.
MusaAnsari, Moddhojuger Muslim Sovvota o Sonskriti, Bangla Academy, 1999, Dhaka.
Board of Researchers, Scientific Indications in the Holy Quran, Islamic Foundation Bangladesh, 2004, Dhaka.

ZiauddinSardar, Science, Technology and development in the Muslim World, Croom Helm, 1977, London.
M. AkborAli, BigghaneMusalmanderObodan (Muslim Contribution to science) Volume 1-12, 1936, Dhaka

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	-	-	-	5
Understand	-	5	5	-	5
Apply	-	5	-	-	10
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	10
Create	-	5	-	-	10
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation s, **SEE**= Semester End Examination

A. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation ,
B. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Current issues evolution of Bangladesh& Viva

Course Code: URBS-4802 .
Course Title: Bangladesh Studies and the History of Independence
Credit Hours: 2 Contact Hours: 2 Contact Hours per Week

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class Test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: The course is designed to help the students in obtaining comprehensive knowledge about the History, Geography, Politics and Constitutional Development, Foreign Policy and International Relations, Economics and Natural Resources, Education and Literature and such other conceptions and ideas that are significantly related to the people and society of

Bangladesh.This course will deepen students understanding of complex interconnection of historical events which lead to the formation of Bangladesh, current trend in political and economic development thereby improving critical thinking along with their written and oral communication skills, quantitative skills and technical literacy; which will make them responsible global citizen.

S/N	**Course Learning Outcomes (CLos)**: Upon the successful completion of the course, students will be able to	Corresponding IIUCMS	Bloom's taxonomy domain/level
CLO-1	Increase the patriotism to beloved motherland and disseminate to attend on the nation and the country over coming all national hindrances as being global citizen in the respect of present and future world order. And appreciate any significant national issue in context of the country and its future integrity.	IIUCMS-1	Cognitive/ Understanding
CLO-2	Develop knowledge as well as ethical awareness and intelligence by studying cultural diversities with the basic geographical characteristics of Bangladesh, ethnology of its people and population distribution. Identify specific stages of Bangladesh's political history with analyzing the historical developments of Bengali nation until the emergence of Bangladesh as an independent country in 1971.	IIUCMS-2	Cognitive/ Analyzing
CLO-3	Have the potential to think differently beyond the fields of the political, constitutional and administrative developments in Modern Bangladesh, critically analyze how different constitutional bodies and socio-political institutions operate their behavior impact on political governance research, so that in all walks of life it can be sustained justice.	IIUCMS-3	Cognitive/ Understanding
CLO-4	Explain the economy and patterns of economic and environmental changes through qualitative and quantitative analysis. This will increase their awareness on any global issues of development processes and the nature of challenges including ways to address them effectively.	IIUCM-2	Cognitive/ Understanding

Section-A (Mid-term: 30 Marks)

1. **Outline study of Bangladesh Geography**: Location, Area, Boundary, Physiographic features, River System, Forest, Climate and Environmental Challenges of Bangladesh. Geographical Impact on the People and Society.

2. **The People of Bangladesh:** Ethnology of the People, Tribal Communities, Population Growth, Composition and Distribution, Population Challenges and Prospects for Bangladesh.
3. **History and Society of Ancient Bengal:** Early settlement and territorial identity, Sasanka (The first independent king), Matsyanyayam and its comparison with the present situation, Pala and Sena dynasty.

4. **History and Society of Bengal under Muslim Rule (1204-1757):** Advent of Islam in Bengal and Its Impact, Composition of Muslim Society in Bengal, Role of Sufism, Foundation of Bengali Nationalism, Educational and Literary Development, Evaluation of the Impact of Muslim Rule on Bengal Society and Civilization.

Section-B (SEE: 50 Marks)

5. **History and Society of Bengal under British Rule (1757-1947):** Introduction of British Colonial Rule in Bengal, British Policy towards Economy and Education, Socio-Religious Reform Movements and the Struggles for Freedom from British Colonialism, Intellectual Movements, Partition of Bengal, Role of Congress and Muslim League, Rising of Nationalism Movements and the Emergence of Pakistan, Impact of British Administrative Policy on the Society of Bengal.

6. **History and Society of Bangladesh during Pakistan Rule (1947-1971):** National disintegration between East and West Pakistan, political mobilization and national movements leading to the independence of Bangladesh.

7. **Political Development in Modern Bangladesh:** Formation and Role of Major Political Parties, Regime Analysis of Modern Bangladesh, Issues of Bangladesh Politics, and Challenges of Democracy.
8. **Constitutional and Administrative Development of Bangladesh:** The Constitution of Bangladesh, its historical background, characteristics, contents, constitutional organizations, amendments and administrative structure.

9. **Foreign Policy and International Relations of Bangladesh:** Principles of Foreign Policy, International Relations of Bangladesh, Role of Bangladesh in International Organizations such as the UN, OIC, SAARC, ASEAN, BIMSTEC etc.

10. **Concept of Development and Sector wise Development in Bangladesh:** Definitions of Development, The Birth of the Human Development Index, MDGs, SDGs, Sector wise development scenario in Bangladesh (Education, Economy, Health, Agriculture, Women Empowerment, Environment) Minerals and Resources, Socio-economic and cultural problems and prospects of Bangladesh.

Text Book:

Muhammad ShamsulHuq, *Bangladesh in International Politics*, (Dhaka: The University Press Limited, 1995).
Sirajul Islam (ed.), *Banglapedia: National Encyclopedia of Bangladesh*, Vol. 1-14, (Dhaka: Asiatic Society of Bangladesh, 2014).
Md. Thowhidul Islam and others, *Bangladesh Studies*. (Dhaka: Bangladesh Institute of Islamic Thought-BIIT, 2017).

Reference Books:

1. Islam, Sirajul, (ed.), Banglapedia: National Encyclopedia of Bangladesh, Vol- 1-10, Asiatic Society of Bangladesh, Dhaka, 1998.
2. Rashid, HarunEr, Geography of Bangladesh, University Press Limited, Dhaka, Bangladesh, 1991.
3. Ali, Mohar, History of the Muslims of Bengal. Vol – 1-3, Islamic Foundation Bangladesh, Dhaka, 2003.
4. Karim, Abdul, Social History of the Muslims of Bengal, BaitushSharaf Islamic Research Institute, Chittagong, Bangladesh, 1985.
5. Huq, Dr. Enamul, A History of Sufism in Bengal, Bangla Academy, Dhaka, 1975.
6. Board of Researchers, Islam in Bangladesh through Ages, Islamic Foundation Bangladesh, 1995.
7. Ahmed, Sufia, Muslim Community in Bengal (1884-1912), Oxford University Press, Dhaka, 1974.
8. Rahim, M.A., The Muslim Society and Politics in Bengal, University of Dhaka, Bangladesh, 1978.
9. Khan, Prof. Dr. Muinuddin Ahmed, Islamic Revivalism, Bangladesh Institute of Islamic Thought (BIIT), 2010.
10. Khan, Dr. Muinuddin Ahmed, Muslim Struggle for freedom in Bengal, Islamic Foundation Bangladesh, 1983.
11. Huq, Dr. Muhammad Inamul, VaroterMusalman O ShwadinotaAndolan, Bangla Academy, Dhaka, 1995.
12. Mallick, Azizur Rahman, British Policy and the Muslims in Bengal, Asiatic Society of Pakistan, Dhaka, 1961.
13. Rahim, Dr. M.A., and others, BangladesherItihash, NowrozKitabistan, Dhaka, Bangladesh, 1994.
14. Khan, Abbas Ali, BanglarMusalmanderItihash, Bangladesh Islamic Center, Dhaka, 2002.
15. Islam, Sirajul, History of Bangladesh, Vol – 1-3, Asiatic Society of Bangladesh, Dhaka, 2008.
16. Asad, Abul, EkshobochorerItihas, Bangladesh Co-operative Book Society, Dhaka, 1997.
17. Barnik, M.A., RasthraBhashaAndolonerItihas, AHDPH.
18. Ahad,,Oli, JatiyoRajniti 1945-1975, Bangladesh Co-operative Book Society, Dhaka, 2004.
19. Ahmad, Abul Mansur, Amar Dekha Rajniteer Poncash Bochor, SrijonProkashoni Ltd. Dhaka, 1988.
20. Ahmed, Kamruddin, Social History of East Pakistan, Dacca, Crescent Book Center, 1967.
21. Salik, Siddiq, Witness to Surrender, The University Press Ltd., 1997.
22. Ahmed, Moudud, Bangladesh: Constitutional Quest for Autonomy, The University Press Ltd., 2003.
23. Khan, Akbar Ali, Discovery of Bangladesh, The University Press Ltd., 2009.
24. Maniruzzaman, Talukdar, Bangladesh Revolution and its Aftermath, University Press Ltd., 1992. 135 25. Khan, Shamsul I., Political Culture, Political Parties

25. Khan, Shamsul I., Political Culture, Political Parties and the Democratic Transition in Bangladesh, The University Press Ltd., 2008.
26. The Constitution of the People‟s Republic of Bangladesh. 27. Halim, Md. Abdul, Constitution, Constitutional Law and Politics: Bangladesh Perspective, Dhaka, 1998. Useful web links:
http://www.bangladesh.gov.bd
http://www.bangladesh.com
http://www.banglapedia.org
http://www.ru.ac.bd/ibs/
http://www.bbs.gov.bd

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		**Evaluations out of 100 marks**			
		CIE (50 marks)			**SEE (50 marks)**
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	-	-	-	5
Understand	-	5	5	-	5
Apply	-	5	-	-	10
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	10
Create	-	5	-	-	10
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester.				

Note: CIE=Continuous Internal Evaluation s, **SEE**= Semester End Examination

A. **Delivery methods & activities**: Lecture, White Board Writing, Questions and Answers, Discussions, Power point Presentation ,
B. **Assessment tools**: Class Attendance, Class test, Quizzes/ Assignment on problem solution, Mid-Term & Final Exam. Current issues evolution of Bangladesh& Viva

Course Code: URBS – 4802.	**Course Title:** Bangladesh Studies.
Credit Hours: 2 (two) C.H.	**Contact Hours:** 2 (two) C.H. (per week)

Course Description: The course is designed to help the students in obtaining comprehensive knowledge about the History and Heritage, Geography and Environment, People and Society, Politics and Constitutional Development, Foreign Policy and International Relations, Economics and Natural

Resources, Education and Literature, Philosophy and Religion, Art and Culture of Bangladesh and such other conceptions and ideas that are significantly related to the people and society of Bangladesh. This course will deepen students understanding of complex interconnection of historical events which lead to the formation of Bangladesh, current trend in political and economic development thereby improving critical thinking along with their written and oral communication skills, quantitative skills and technical literacy. It will also enhance their understanding of current phenomena in the light of history which will make them responsible global citizen.

Course Learning Outcomes: At the end of the course, the students will be able to-

CL01	Understand basic geographical characteristics of Bangladesh and its impact on the life and society, ethnology of its people and population distribution.
CL02	Identify specific stages of Bangladesh's political history, through the ancient, medieval, colonial and post-colonial periods and critically analyzesocio-cultural plurality in Bangladesh.
CL03	Have a comprehensive concept about the historical developments of Bengali nation until the emergence of Bangladesh as an independent country in 1971.
CL04	Critically analyze and present cogent argument on why tensions and contestations between and among social groups may emerge within and among states both in written and oral forms.
CL05	Critically analyze how different constitutional bodies and socio-political institutions operate and how their behavior impact on political governance.
CL06	Evaluate the political, constitutional and administrative developments in Modern Bangladesh.
CL07	Appreciate any significant national issue in context of demand of time and future integrities.
CL08	Explain the economy and patterns of economic changes through qualitative and quantitative analysis. This will increase their awareness on global issues of development processes and the nature of environmental challenges including ways to address them effectively.

SL.NO	**CONTENT OF COURSE (as Summary)**	Hrs.	CLOs
01.	**Outline study of Bangladesh Geography**: Location, Area, Boundary, Physiographic features, River System, Forest, Climate and Environmental Challenges of Bangladesh. Geographical Impact on the People and Society.	06	
02.	**The People of Bangladesh:** Ethnology of the People, Tribal Communities, Population Growth, Composition and Distribution, Population Challenges and Prospects for Bangladesh.	03	
03.	**History and Society of Ancient Bengal:** Early settlement and territorial identity, Sasanka (The first independent king), Matsyanyayam and its comparison with the present situation, Pala and Sena dynasty.	06	
04.	**History and Society of Bengal under Muslim Rule (1204-1757):** Advent of Islam in Bengal and Its Impact, Composition of Muslim Society in Bengal, Role of Sufism, Foundation of Bengali Nationalism, Educational and Literary Development, Evaluation of the Impact of Muslim Rule on Bengal Society and Civilization.	06	
05.	**History and Society of Bengal under British Rule (1757-1947):** Introduction of British Colonial Rule in Bengal, British Policy towards Economy and Education, Socio-Religious Reform Movements and the Struggles for Freedom from British Colonialism, Intellectual Movements, Partition of Bengal, Role of Congress and Muslim League, Rising of Nationalism Movements and the Emergence of Pakistan, Impact of British Administrative Policy on the Society of Bengal.	06	

06.	**History and Society of Bangladesh during Pakistan Rule (1947-1971):** National disintegration between East and West Pakistan, political mobilization and successive national movements leading to the independence of Bangladesh.	03	
07.	**Political Development in Modern Bangladesh:** Formation and Role of Major Political Parties, Regime Analysis of Modern Bangladesh, Issues of Bangladesh Politics, and Challenges of Democracy.	03	
08.	**Constitutional and Administrative Development of Bangladesh:** The Constitution of Bangladesh, its historical background, characteristics, contents, constitutional organizations, amendments and administrative structure.	03	
09.	**Foreign Policy and International Relations of Bangladesh:** Principles of Foreign Policy, International Relations of Bangladesh, Role of Bangladesh in International Organizations such as the UN, OIC, SAARC, ASEAN, BIMSTEC etc.	03	
10.	**Concept of Development and Sector wise Development in Bangladesh:** Definitions of Development, The Birth of the Human Development Index, MDGs, SDGs, Sector wise development scenario in Bangladesh (Education, Economy, Health, Agriculture, Women Empowerment, Environment) Minerals and Resources, Socio-economic and cultural problems and prospects of Bangladesh.	06	

Text Book:

Muhammad ShamsulHuq, *Bangladesh in International Politics*, (Dhaka: The University Press Limited, 1995).
Sirajul Islam (ed.), *Banglapedia: National Encyclopedia of Bangladesh*, Vol. 1-14, (Dhaka: Asiatic Society of Bangladesh, 2014).
Md. Thowhidul Islam and others, *Bangladesh Studies*. (Dhaka: Bangladesh Institute of Islamic Thought-BIIT, 2017).

Reference Books:

Harun Er Rashid, *Geography of Bangladesh*, (Dhaka: University Press Limited, 1991).
Mohar Ali, *History of the Muslims of Bengal*. Vol – 1-3, (Dhaka: Islamic Foundation Bangladesh, 2003).
Azizur Rahman Mallick, *British Policy and the Muslims in Bengal*, (Dhaka: Asiatic Society of Pakistan, 1961).
Shaikh Maqsud Ali, *From East Bengal to Bangladesh: Dynamics and Perspectives*, (Dhaka: The University Press Ltd., 2009).
Rounaq Jahan, *Bangladesh Politics: Problems and Issues*, (Dhaka: The University Press Limited, 2005).
Md. Abdul Halim, *Constitution, Constitutional Law and Politics: Bangladesh Perspective*, (Dhaka: BCC Foundation, 1998).

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05

Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation Marks, SEE= Semester End Examination Marks

G. Non-Engineering Skills Courses

Course Code: ACC-2401 **Course Title: Financial and Managerial Accounting,**
Credit Hours: **2** **Contact Hours: 2 per week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Financial and Managerial Accounting' in regards to accounting and financial statement. book keeping system, errors correction in the trial balance, bank reconciliation statement, budget and planning.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	**Explain** the basic concept of financial accounting, cost accounting and management accounting.	PLO-11	Cognitive/ Understanding
CLO-2	**Analyze** the basic concept of Cost Accounting and preparation of Cost Sheet.	PLO-11	Cognitive/ analyzing
CLO-3	**Apply** the tools from accounting and cost accounting this would facilitate the decision making i.e. Budgeting, Make or Buy decision.	PLO-11	Affective/ Organization
CLO-4	**Compare** the different business situations and suggest to best solution with analytical abilities **for an organization.**	PLO-11	Cognitive/ Evaluating

Section –A (Mid-term Exam. 30 Marks)

1. **Preliminaries:** Introduction to Accounting, History and development of accounting thought, types of accounting, Accounting Principles & ethics, Accounting Equation & Transaction Analysis.
2. **Introduction to Financial Statements**: Recording Business Transactions, The Accounts & their types.
3. **Double-Entry Book keeping System**; Invoice, discount from purchase price, purchase return and allowances, Sale of inventory, sales discount, sales returns and allowances; Journals, ledger & Trial balance.

Section- B (SEE: 50 Marks)
Group- A (20-Marks)

4. **Correcting errors in the trial balance:** The Adjusting and Closing Procedure: The adjusting process, Accrual versus cash basis Accounting, Preparation of Adjusted trial balance and financial statements, Closing entries & Reversing entries.
5. **Using accounting information in decision-making**. Accounting in practice, Worksheet. Purchase book, sales book, cashbook, patty cashbook, etc. Control accounts and subsidiary accounts. Bank reconciliation statement.

Group-B (30 Marks)

6. **Cost In General: C**ost in general: objectives & classifications; Costing Journals; Job order costing, Process costing & Overhead costing, cost sheet; Cost of goods sold statement.
7. **Marginal & Relevant costing**: Marginal costing tools and techniques, cost-volume-profit analysis.

8. **Guidelines for Decision-Making**: Budget, Capital budgeting; Planning, evaluation & control of capital expenditures.
9.

Recommended Reference:

1. Charles T. Horngren & walter T. Harrison, Accounting.
2. Adolph Matz & Milton F. Usry, Cost Accounting- Planning and Control
3. Sankar Prasad Basu & Monilal Das, Practice in Accountancy
4. Jerry J. Weygandt, D E. Kieso & Paul D. Kimmel, Accounting Principles :
5. Jay M Smith & K Fred Skousen, Intermediate Accounting.

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation , **SEE**= Semester End Examination

Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

Assessment tools: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term & Final Exam. Project evaluation & Viva

Course Code: ECON-3501 **Course Title: Principles of Economics**
Credit Hours: 2 **Contact Hours:** 2 per week

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student will learn about 'Principle of Economics' in regards to the basic idea in micro and macroeconomics, production and market, economic policy, economics of development and planning.

S/N	**Course Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy

			domain/level
CLO-1	**Explain** the knowledge of the fundamental concepts and theories of micro and macro-economics.	PLO-11	Cognitive/ Understanding,
CLO-2	**Analyze** the key indicators of economic growth.	PLO-11	Cognitive/ Analyzing
CLO-3	**Compare** the economic theories and concepts to analyze behavior of individuals, firms and nations to act as a responsible citizen.	PLO-11	Cognitive/ Analyzing

Section –A (Mid-term Exam: 30 Marks)

1. Introduction: Definition of economics, Scope and utility of studying economics.

2. Micro-economics: The theory of demand and supply and their elasticity, Price determination, Nature of an economic theory, applicability of economic theories to the problems of developing countries. Indifference curves technique, Marginal utility analysis,

3. Production: Production function, types of productivity, The nature of Isoquants and Isocosts, Rational region of production of an engineering firm. Euler's theorem.

Section- B (SEE: 50 Marks)

Group- A (20-Marks)

4. Market: Concepts of market and market structure. Cost analysis and cost function. Small scale production and large-scale production, Optimization, Theory of distribution.

5. Macroeconomics: Savings, investment, employment, National income analysis, Inflation.

Group-B (30 Marks)

6. Economic Policy: Monetary policy, Fiscal policy and trade policy with reference to Bangladesh.

7. Economics of development: Dimensions of development, Relevance of theory, the employment problem, Human resource development

8. Economics of planning: Planning and market, Policy models, Planning experience.

Recommended Reference:

1. Richard Leftwich, The Price System and Resource Allocation
2. P.A. Samuelson, Economics
3. P.A. Samuelson & Nordhaus, Economics
4. G.J. Stigler, The Theory of Price
5. McConnell & L.Brue, Economics (Principles, Problems and Policies)

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	

Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.

Note: CIE=Continuous Internal Evaluation ,**SEE**= Semester End Examination.

A. Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions
Power point Presentation,

B.Assessment tools: Class Attendance, Class test, Quizzes/ Assignment.
Mid-Term & Final Exam. Project evaluation & Viva

Course Code: MGT-3601 **Course Title: Industrial Management**
Credit Hours: 2 **Contact Hours: 2 per week**

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student learn about 'Industrial Management' in regards to the importance of management, manpower planning and development, cost & financial management, marketing and production management, industrial law and professional practice**.**

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corresponding PLOs	Bloom's taxonomy domain/level
CLO-1	**Explain** the theories and principles of modern management and apply the concepts to the management of organizations in private and public sector.	PLO-11	Cognitive/ Creating
CLO-2	**Understand** how managers can effectively plan in today's dynamic environment,	PLO-11	Cognitive/ Understanding
CLO-3	**Identify** what strategies organizations might use to become more innovative and explain how the industrial company markets, price it's products and also how the company deal with its social environment.	PLO-6	Cognitive/ Analyzing

Section –A (Mid-term Exam: 30 Marks)

1. Preliminaries: Definition, Importance of management, Evolution, Functions of management, Introduction to Industry & organizational management.

2. Organization and it's Environment: Environmental context of the Organization.

3. Organizing & stuffing: Theory & structure, Co-ordination, Span of control, Authority delegation, Formal & Informal Groups, Committee and task force, Manpower planning & Development.

Section- B (SEE: 50 Marks)

Group- A (20-Marks)

4. Cost & Financial Management: Investment analysis, benefit-cost analysis & it's implications in decision making. Cost planning & Price Control, budget &budgetary control, development planning process.

5. Marketing management: Concepts, strategy, sales promotion, Transportation & Storage. Technology management: Management of innovation & changes, technology lifecycle.

5. Marketing management: Concepts, strategy, sales promotion, Transportation & Storage. Technology management: Management of innovation & changes, technology lifecycle.

Group-B (30 Marks)

7. Industrial law: Law of contract, sale of goods, Hire and purchase, Negotiable instrument Act, patent right and validity. Factories act, Industrial relations ordinance, workmen's compensation act.

8. Professional Practice: Tender documentation, General conditions of tender, Tech. Specification, Purchase & procurement rules-2004, Technical evaluation, Copyright, Intellectual property right.

Recommended Reference:

1. Ricky W. Griffin, Management
2. Heinz Weihrich & Harold Koontz, Management A Global Perspective
3. W.J. Stevenson, Management Science
4. Terry & Frankin, Principle of Management
5. Edwin B. Flippo, Personnel Management.
6. Arun Monappa, Industrial Relations
7. Naceur Jabnoun, Islam & Management
8. F.R. Faridi, Islamic Principles of Business Organization and Management
9. Leon G. Schiffman & L.L. Kanuk, Consumer Behavior
10. W.J. Stevenson, Management Science
11. Herold Koontz, Management

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective Learning	Mid-term: (30)	Assignment/ Class Test: (10)	Attendance Marks (:10)	Written Exam: (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
	Responding	x	x	10	
	Course teachers may change the magnitude of marks in Bloom's category(Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed to during the semester.				

Note: CIE=Continuous Internal Evaluation Marks, **SEE**= Semester End Examination Marks.

Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,

Assessment tools: Class Attendance, Class test, Quizzes/ Assignment.

Mid-Term & Final Exam. Project evaluation & Viva

Course Code: LAW-4725 Course Title: Professional Ethics and Environmental Protection Law
Credit Hours: 2 Contact Hours: 2 per week

Course Assessments	**CIE: Continuous Internal Evaluation**	**Attendance**	**10 Marks**
		Class test/ Assignment/ Quizzes	**10 Marks**
		Mid-term	**30 Marks**
	SEE: Semester End Examination		**50 Marks**

Objectives: In this course student learn about 'Professional Ethics and Environmental Protection Law' in regards to nature and concept of law, company law, labour law, history and development of engineering ethics, ethical expectations and cyber law.

S/N	**Course Learning Outcomes (CLOs):** Upon the successful completion of the course, students will be able to	Corres-ponding PLOs	Bloom's taxonomy domain/level
CLO-1	Identify the legal problems in social and environmental contexts commonly encountered by engineers in their professional fields/industries.	PLO-2,	Cognitive/ Analyzing,
CLO-2	Understand the impact of knowledge about Constitutional provisions for the protection of environment need for development.	PLO-7	Cognitive/ Understanding
CLO-3	Demonstrate analytical skills through investigation and evaluation of ethical problems in engineering settings.	PLO-8	Cognitive/ Analyzing
CLO-4	Communicate effectively about their duties and responsibilities as professionals through gaining knowledge of the philosophies of ethics, professional practice, and world culture	PLO-10	Affective/ Responding

Section-A (Mid-term Exam: 30 Marks)

1. Law Basics: Nature and concept of law. Schools of Jurisprudence: Analytical, Historical, Philosophical, Sociological & Natural. Administration of Justice: Theories of punishment. Sources of Law: Custom, Precedent and Legislation. Rights and Duties. Legal Personality. Ownership and Possession. Definition and theories of Law, Principles of law of contract, agency, partnership, sale of goods negotiable instruments, insurance and insolvency.

2. Company law: The companies act with special reference to the amendments and ordinances applicable to Bangladesh. Law regarding formation, Incorporation, Management and winding up of companies.

3.Labor Law: The scope and sources of labor law. Law in relation to wages, hours, health, safety and other condition to work. The legislation effecting employment in factories. The trade union legislation arbitration, the policy of the state in relation to labor. Elementary principles of labor law.

Section-B (SEE: 50 Marks)

Group-A (20-Marks)

4. History and Development of Engineering Ethics: Study of Ethics in Engineering. Applied Ethics in engineering. Human qualities of an engineer. Obligation of an engineer to the clients and to other engineers. Measures to be taken in order to improve the quality of engineering profession.

5. Ethical Expectations: Employers and Employees inter-professional relationship, maintaining a commitment of Ethical standards. Desired characteristics of a professional code. Institutionalization of Ethical conduct.

Group-B (30-Marks)

6. Cyber Law Introduction : The need for Cyber Law , Regulation of Technology and Internet , The Internet and the Problems of Geography and Sovereignty , Freedom of Expression on the Internet,

7. The Relationship between Legal and Technological Regulation: Intellectual Property: Copy rights, Trade Marks, Industrial Designs. Electronic and Digital Signature. Embedding Law into Technology. Electronic Contract.
8. Liability of Internet Intermediaries: Defamatory Content, Privacy, Copy right, Infringement. Liabilities relating to electronic financial transaction. Nature and scope of cybercrime, Regulation of Cyber Crime. Offences and Punishment of Technology Crimes.

Recommended Reference:

1. A. K. Sen, A Hand Book of Commercial Law.
2. A. A. Khan, Labour and Industrial Law.
3. J. D. Mabboth, An Introduction to Ethics
4. Stacey L. Dogan, Copyright in Cyberspace: An Introduction
5. A. B.Siddique, The Law of Contract.
6. Emile Durkheim, Professional Ethics and Civics Morals
7. Jonathan L. Zittrain, , Internet Law: Technological Complements to Copyright
8. Coopers, Outline of Industrial Law.
9. A. Zulfiquar, V A Text Book on the Bangladesh Labour Act-2006.
10. P. Narayanan, Intellectual Property Law.
11. A. R. Khan, Business Ethics
12. G. E. Moore:, Principia Ethicia
13. M. Radar, Ethics and the Auman Community

A Sample Question Assessment Pattern (Theory courses):

Bloom's Category		Evaluations out of 100 marks			
		CIE (50 marks)			SEE (50 marks)
Cognitive learning	Affective learning	Mid-term (30)	Assignment/ Class Test (10)	Attendance Marks (10)	Written Exam (50)
Remember	-	5	-	-	5
Understand	-	-	5	-	10
Apply	-	5	-	-	05
Analyze	-	5	-	-	10
Evaluation	-	10	5	-	15
Create	-	5	-	-	05
x	Responding	x	x	10	
Remarks	Course teachers may change the magnitude of marks in Bloom's category (Both for CIE and SEE), but he/she will have to keep in mind that the % of higher order learning mode must be about 60% or more and all the Bloom's categories to be addressed during the semester. If necessary, a course teacher may also use Cognitive (Knowledge), Affective (Attitude) and Psychomotor (Skills) domain of Bloom's Taxonomy.				

Note: CIE=Continuous Internal Evaluation, **SEE**= Semester End Examination
Delivery methods & activities: Lecture, White Board Writing, Questions and Answers, Discussions Power point Presentation,
Assessment tools: Class Attendance, Class test, Quizzes/ Assignment. Mid-Term & Final Exam. Project evaluation & Viva

27. Appendix: Summary of Batch-wise Changes in Courses

Program: B. Sc. Engg. (EEE)

<table>
<tr><td>Sl.</td><td colspan="2">Semester</td><td colspan="2">Total Credit</td><td colspan="5">Remarks</td></tr>
<tr><td>1.</td><td colspan="2">Spring-2006</td><td colspan="2">160</td><td colspan="5">Approved by UGC</td></tr>
<tr><td>2.</td><td colspan="2">Autumn-2006</td><td colspan="2">160</td><td colspan="5">Same as Spring-2006</td></tr>
<tr><td>3.</td><td colspan="2">Spring-2007</td><td colspan="2">159</td><td colspan="5">URIH-4701 (1 credit) dropped from syllabus.</td></tr>
<tr><td>4.</td><td colspan="2">Autumn-2007</td><td colspan="2">159</td><td colspan="5">Same as Spring-2007</td></tr>
<tr><td>5.</td><td colspan="2">Spring-2008</td><td colspan="2">161</td><td colspan="5">URAL-1202 (1 Credit) and URIS-2405 (1 credit) added to the syllabus.</td></tr>
<tr><td>6.</td><td colspan="2">Autumn-2008</td><td colspan="2">161</td><td colspan="5">Same as Spring-2008</td></tr>
<tr><td>7.</td><td colspan="2">Spring-2009</td><td colspan="2">161</td><td colspan="5">Same as Spring-2008</td></tr>
<tr><td>8.</td><td colspan="2">Autumn-2009</td><td colspan="2">161</td><td colspan="5">URIS-3609 (2 credit) is replaced with URIS-3607 (1 credit) and URIH-4701 (1 credit).</td></tr>
<tr><td>9.</td><td colspan="2">Spring-2010</td><td colspan="2">161</td><td colspan="5">Chem-2301 (3 credit) is rearranged as Chem-2301 (2 credit) and Chem-2302 (1 credit).</td></tr>
<tr><td>10.</td><td colspan="2">Autumn-2010</td><td colspan="2">161</td><td colspan="5">Same as Spring-2010</td></tr>
<tr><td>11.</td><td colspan="2">Spring-2011</td><td colspan="2">161</td><td colspan="5">Same as Spring-2010</td></tr>
<tr><td>12.</td><td colspan="2">Autumn-2011</td><td colspan="2">161</td><td colspan="5">Same as Spring-2010</td></tr>
<tr><td rowspan="10">13.</td><td colspan="2">Spring-2012</td><td colspan="2">161</td><td colspan="5">Following changes in courses has been made:</td></tr>
<tr><td rowspan="2">Sl. No.</td><td colspan="3">New Course</td><td colspan="3">Old Course</td></tr>
<tr><td>Course Code</td><td>Course Title</td><td>Credit Hour</td><td>Contact Hour</td><td>Course Code</td><td>Course Title</td><td>Credit Hour</td><td>Contact Hour</td></tr>
<tr><td>1.</td><td>UREL-1103</td><td>Advanced English</td><td>1</td><td>3</td><td>UREL-1103</td><td>Advanced English</td><td>2</td><td>3</td></tr>
<tr><td>2.</td><td colspan="3">Dropped from syllabus</td><td>URAL-1202</td><td>Intermediate Arabic</td><td>1</td><td>3</td></tr>
<tr><td>3.</td><td colspan="3">Dropped from syllabus</td><td>URIS-2405</td><td>Dealings and Behavior in Islam</td><td>1</td><td>1</td></tr>
<tr><td>4.</td><td>URBS-4802</td><td>Bangladesh Studies</td><td>1</td><td>2</td><td>URBS-4802</td><td>Bangladesh Studies</td><td>2</td><td>2</td></tr>
<tr><td>5.</td><td>MATH-1101</td><td>Math I - (Differential and Integral Calculus)</td><td>3</td><td>3</td><td>MATH-1101</td><td>Elementary Mathematics</td><td>1</td><td>3</td></tr>
<tr><td>6.</td><td>MATH-3501</td><td>Math V - (Complex Variable, Laplaces and Fourier Analysis, Z-transform)</td><td>3</td><td>3</td><td>MATH-3501</td><td>Mathematics IV</td><td>2</td><td>3</td></tr>
<tr><td>7.</td><td>STAT-</td><td>Statistics</td><td>2</td><td>2</td><td>STAT-</td><td>Statistics</td><td>3</td><td>3</td></tr>
</table>

		1201				1211			
	8.	PHY-1102	Physics I Sessional	1	3	PHY-1104	Physics I Sessional	1.5	3
	9.	PHY-1202	Physics II Sessional	1	3	PHY-1204	Physics II Sessional	1.5	3
	10.	CHEM-2301	Chemistry	3	3	CHEM-2301	Chemistry	2	3
	11.	CSE-1101	Computer Fundamentals	2	2	CSE-1101	Computer Fundamentals	1	2
	12.	Dropped from syllabus				EEE2405	Engineering Electromagnetism	3	3
	13.	EEE2413	Instrumentation and Measurement	3	3	New Course			
	14.	EEE-4822	General Viva-Voce	1	1	New Course			
14.	Autumn-2012		161		Same as Spring-2012				
15.	Spring-2013		161		EEE-4800 (6 credit) replaced with EEE-4858 (4 credit), EEE-4841 (1 credit) and EEE-4842 (1 credit).				
16.	Autumn-2013		161		Same as Spring-2013				
17.	Spring-2014		161		Following changes in courses has been made:				
	Sl. No.	New Course				Old Course			
		Course Code	Course Title	Credit Hour	Contact Hour	Course Code	Course Title	Credit Hour	Contact Hour
	1.	CSE--1203	Data Structure and Algorithm	2	2	CSE-1201	Computer Programming	3	3
	2.	CSE--1204	Data Structure and Algorithm Sessional	1	2	CSE-1202	Computer Programming Sessional	1.5	3
	3.	CSE--2302	Object Oriented Programming	1.5	3	New Course			
	4.	Dropped from syllabus				EEE2413	Instrumentation and Measurement	3	3
	5.	Dropped from syllabus				EEE-3503	Power System I	3	3
	6.	Dropped from syllabus				EEE-3504	Power System I Sessional	1.5	3
	7.	Dropped from syllabus				EEE-4842	Industrial Attachment/ Internship	1	2
	8.	Dropped from syllabus				EEE-36XX	Elective II	3	3
	9.	EEE-2415	Transmission & Distribution of Electrical Power	3	3	New Course			

<table>
<tr><td></td><td>10.</td><td>EEE-3519</td><td>Power System Analysis</td><td>3</td><td>3</td><td colspan="4">New Course</td></tr>
<tr><td></td><td>11.</td><td>EEE-3520</td><td>Power System Analysis Sessional</td><td>1.5</td><td>3</td><td colspan="4">New Course</td></tr>
<tr><td></td><td>12.</td><td>EEE-3621</td><td>Engineering Electromagnetism</td><td>3</td><td>3</td><td colspan="4">New Course</td></tr>
<tr><td></td><td>13.</td><td>EEE-3502</td><td>Continuous Signals and Linear Systems Sessional</td><td>1</td><td>2</td><td colspan="4">New Course</td></tr>
<tr><td></td><td>14.</td><td>EEE-4721</td><td>Research Methodology</td><td>1</td><td>1</td><td>EEE-4841</td><td>Research Methodology & Seminar</td><td>1</td><td>2</td></tr>
<tr><td></td><td>15.</td><td>EEE-4860</td><td>Thesis/Project</td><td>4</td><td>8</td><td>EEE-4858</td><td>Thesis/Project</td><td>4</td><td>8</td></tr>
<tr><td>18.</td><td colspan="2">Autumn-2014</td><td colspan="2">161</td><td colspan="5">Same as Spring-2014</td></tr>
<tr><td>19.</td><td colspan="2">Spring-2015</td><td colspan="2">161</td><td colspan="5">Same as Spring-2014</td></tr>
<tr><td>20.</td><td colspan="2">Autumn-2015</td><td colspan="2">161</td><td colspan="5">Same as Spring-2014</td></tr>
<tr><td>21.</td><td colspan="2">Spring-2016</td><td colspan="2">161</td><td colspan="5">Same as Spring-2014</td></tr>
<tr><td>22.</td><td colspan="2">Autumn-2016</td><td colspan="2">161</td><td colspan="5">Same as Spring-2014</td></tr>
<tr><td rowspan="10">23.</td><td colspan="2">Spring-2017</td><td colspan="2">161</td><td colspan="5">Following changes in courses has been made:</td></tr>
<tr><td rowspan="2">Sl. No.</td><td colspan="3">New Course</td><td colspan="3">Old Course</td><td colspan="2"></td></tr>
<tr><td>Course Code</td><td>Course Title</td><td>Credit Hour</td><td>Contact Hour</td><td>Course Code</td><td>Course Title</td><td>Credit Hour</td><td>Contact Hour</td></tr>
<tr><td>1.</td><td>PHY-1102</td><td>Physics I Sessional</td><td>1</td><td>2</td><td>PHY-1102</td><td>Physics I Sessional</td><td>1</td><td>3</td></tr>
<tr><td>2.</td><td>PHY-1202</td><td>Physics II Sessional</td><td>1</td><td>2</td><td>PHY-1202</td><td>Physics II Sessional</td><td>1</td><td>3</td></tr>
<tr><td>3.</td><td>CSE-1105</td><td>Computer Programming I</td><td>2</td><td>2</td><td>CSE-1103</td><td>Computer Basic and Programming</td><td>2</td><td>2</td></tr>
<tr><td>4.</td><td>CSE-1106</td><td>Computer Programming I Sessional</td><td>1</td><td>2</td><td>CSE-1104</td><td>Computer Basic and Programming Sessional</td><td>1</td><td>2</td></tr>
<tr><td>5.</td><td>CSE-1205</td><td>Computer Programming II</td><td>2</td><td>2</td><td>CSE-1203</td><td>Data Structure and Algorithm</td><td>2</td><td>2</td></tr>
<tr><td>6.</td><td>CSE-1206</td><td>Computer Programming II Sessional</td><td>1</td><td>2</td><td>CSE-1204</td><td>Data Structure and Algorithm Sessional</td><td>1</td><td>2</td></tr>
<tr><td>7.</td><td>CE-1202</td><td>Engineering Drawing</td><td>1</td><td>2</td><td>CE-1202</td><td>Engineering Drawing Sessional</td><td>1</td><td>2</td></tr>
<tr><td>8.</td><td>EEE-2305</td><td>Numerical Technique</td><td>1</td><td>1</td><td colspan="4">New Course</td></tr>
</table>

	9.	EEE-2306	Numerical Technique Sessional	1	2	EEE-2310	Numerical Technique Sessional	1.5	3
	10.	EEE-3508	Circuit Simulation Sessional	1	2	New Course			
	11.	Dropped from the Syllabus				EEE-3502	Continuous Signals and Linear Systems Sessional	1	2
	12.	EEE-3612	Electrical Service Design Sessional	1	2	EEE-3610	Electrical Service Design Sessional	1.5	3
	13.	EEE-4709	Research Methodology and Seminar	1	1	EEE-4721	Research Methodology	1	1
	14.	EEE-4753	VLSI I	3	3	EEE-4711	VLSI Design Technique and Modeling	2	2
	15.	EEE-4754	VLSI I Sessional	1.5	3	EEE-4712	VLSI Design Technique and Modeling Sessional	1	3
	16.	Dropped from the Syllabus				CSE-2302	Object Oriented Programming	1.5	3

24.	Autumn-2017	161	Following changes in courses has been made:	

	Sl. No.	New Course				Old Course			
		Course Code	Course Title	Credit Hour	Contact Hour	Course Code	Course Title	Credit Hour	Contact Hour
	1.	UREL-1106	Advanced English	2	3	UREL-1103	Advanced English	1	3
	2.	URTE-1101	Text of Ethics and Morality	1	2	URFL-1101	Foreign Language- 01	1	2
	3.	URED-1201	Basic Principles of Islam	2	2	URIS-1101	Islamic '*Aqidah*	1	1
						URIS-1203	Introduction to '*Ibadah*	1	1
	4.	URED-2302	Sciences of Qur'an and Hadith	1	2	URIS-2303	Introduction to *Qur'an* and *Sunnah*	1	2
	5.	URED-2305	Comparative Religion	3	3	New Course (equivalent to URED-1201 and URED-2302 for non-Muslims only).			
	6.	URBL-2401	Functional Bengali Language	2	2	New Course			
	7.	URED-3503	Introduction to Political	1	2	URIS-3504	Introduction to Political	1	1

		Thoughts and Social Behavior				Thoughts		
8.	URED-3604	Life and Teachings of the Prophet Muhammad (*SAAS*)	1	2	URIS-3607	Biography of the Prophet (*SAAS*)	1	1
9.	URIH-4701	A Survey of Islamic History and Culture	1	2	URIH-4701	History of *Khilafah* and Muslim contribution to world civilization (Up to 1258 A.D.)	1	1
10.	URBS-4802	Bangladesh Studies and History of the Independence	2	2	New Course			
11.	Dropped from the Syllabus				URBS-4802	Bangladesh Studies	1	2
12.	MATH-1107	Mathematics -I (Differential & Integral Calculus)	3	3	MATH-1101	Math I (Differential and Integral Calculus)	3	3
13.	MATH-1207	Mathematics-II (Differential Equation & Geometry)	3	3	MATH-2303	Math III (Differential Equations and Partial Differential Equations)	3	3
14.	MATH-2309	Mathematics-III (Linear Algebra)	3	3	New Course			
15.	MATH-2409	Mathematics-IV (Complex Variable and Vector Analysis)	3	3	New Course			
16.	Dropped from the Syllabus				MATH-1202	Math II (Co-Ordinate Geometry and Higher Trigonometry)	3	3
17.	Dropped from the Syllabus				MATH-2404	Math IV (Complex Variable, Lap laces and Fourier Analysis, Z-transform)	3	3

	18.	Dropped from the Syllabus				MATH-3505	Math V (Linear Algebra, Matrices and Vector Analysis)	3	3
	19.	STAT-2301	Probability & Statistics	2	2	STAT-1201	Statistics	2	2
	20.	PHY-1204	Physics Sessional	1.5	3	PHY-1202	Physics II Sessional	1	2
	21.	CHEM-2304	Chemistry Sessional	1.5	3	CHEM-2302	Chemistry Sessional	1	2
	22.	LAW-4725	Professional Ethics and Environmental Protection Law	2	2	LAW-4721	Law and Professional Ethics	2	2
	23.	Dropped from the Syllabus				PHY-1102	Physics I Sessional	1	2
	24.	Dropped from the Syllabus				EEE-2305	Numerical Technique	1	1

	Semester	Total Credit		Remarks
25.	Spring-2018	161	Same as Autumn-2017	Introduced OBE
26.	Spring-2019	161	Same as Autumn-2017	Introduced OBE
27.	Autumn-2019	161	Same as Autumn-2017	Introduced OBE
28.	Spring-2020	161	Same as Autumn-2017	Updated COs, Mapping etc.
29.	Autumn-2020	161	Same as Autumn-2017	Introduced DP, GF, CIE, SEE, CEP, IEEE Ref., & Updated OBE.
	Spring-2021	162	**Following changes in courses has been made:**	

	New Course				**Old Course**			
SL	Course Code	Course Title	Credit Hour	Contact Hour	Course Code	Course Title	Credit Hour	Contact Hour
1.	EEE-3608	Research Methodology and Seminar	1	2	EEE-4709	Research Methodology and Seminar	1	1
2.	EEE-4804	Industrial Attachment	1	2	New Course			