

Proposed Program Curriculum

**BACHELOR OF SCIENCE IN
COMPUTER SCIENCE AND ENGINEERING (CSE)
Part-A**



**Faculty of Science and Engineering
Department of Computer Science and Engineering (CSE)
North Bengal International University**

1. Title of Academic Program

Bachelor of Science in Computer Science and Engineering

2. Name of the University

North Bengal International University (NBIU)

3. Vision of the University

The vision of the university is to become a leading-edge educational institution of the country by providing high quality education to the young generation in order to equip them with the knowledge, skill and attributes necessary for the development of the country. It aims at attracting good students, faculty and staff from home and abroad.

4. Mission of the University

The mission of North Bengal International University is to achieve the goals of higher education and sustainable economic growth in the country by producing competent graduates in their selected disciplines. To fulfill our vision, we are intended to prepare our student as:

UM1	To critical thinkers with knowledge creation and necessary analytical skills.
UM2	To efficient in oral, written and digital communication.
UM3	To life-long learners with excellent leadership skills.
UM4	To self-inspired innovators.
UM5	To conscious about social justice and sustainability.

5. Name of the Program Offering Entity (Department)

Department of Computer Science and Engineering (CSE)

6. Vision of the Program Offering Entity

To produce high caliber graduates who are well-versed in both electrical and computer engineering and will serve as pioneers in addressing global challenges for the betterment of life and society.

7. Mission of the Program Offering Entity

M1	To provide the students with adequate technical knowledge in Electrical & Computer Engineering for solving the national and global problems.
M2	To produce skilled professionals with high ethical and moral values to serve the society.
M3	To conduct advanced researches in order to tackle dynamic challenges of expanding technological era and improve the quality of human life.

8. Objectives of the Program Offering Entity

- a) Provide high quality education in the field of electrical and computer engineering upholding the ethical and moral standards.
- b) Produce graduates to work as engineering professionals in domestically and internationally.
- c) Conduct study into current social and technological issues, with the goal of developing effective solutions for national and global development.

9. Name of the Degree

Bachelor of Science in Computer Science and Engineering abbreviated as B.Sc. Engg. (CSE)

10. Description of the Program

The bachelor degree program is extended over a period of 4 years and requires **160 credits**. This program is to be completed in **8 semesters**, each year **having 2 semesters**. Each semester will be of effective 13 weeks duration. Minimum 160 credits and minimum CGPA 2.20 out of 4 are required to obtain B.Sc. Engineering degree.

11. Graduate Attributes (based on need assessment)

Learning Outcome Domain	Level Descriptors
Cognitive Domain	<ol style="list-style-type: none">1. Remember: Remember or recall information such as facts, terminology, problem-solving strategies, rules2. Understand: Some degree of understanding is required in order to change the form of communication, translate, restate what has been read or heard, see connections or relationships among parts of a communication (interpretation), draw conclusions, see consequences from information (inference).3. Apply: Use previously acquired information in a setting other than the one in which it was learned. Because problems at this level are presented in a different and applied way, one cannot rely on content or context to solve the problem.

	<p>4. Analyze: Identification of logical errors (e.g., point out contradictions, erroneous inference) or differentiate among facts, opinions, assumptions, hypotheses, conclusions. One is expected to draw relations among ideas and to compare and contrast.</p> <p>5. Evaluate: Requires the formation of judgments and decisions about the value of methods, ideas, people, products must be able to state the bases for judgments (e.g., external criteria or principles used to reach conclusions.)</p> <p>6. Create: Requires production of something unique or original. At this level, one is expected to solve unfamiliar problems in unique way, or combine parts to form a unique or novel solution.</p>
Affective Domain	<p>1. Receive: One is expected to be aware of or to passively attend to certain stimuli or phenomena. Simply listening and being attentive are the expectations.</p> <p>2. Respond: One is required to comply with given expectations by attending or reacting to certain stimuli. One is expected to obey, participate, or respond willingly when asked or directed to do something.</p> <p>3. Value: Display behavior consistent with a single belief or attitude in situations where one is forced or asked to comply. One is expected to demonstrate a preference or display a high degree of certainty and conviction.</p> <p>4. Organization: Commitment to a set of values. This level involves 1) forming a reason why one values certain things and not others, and 2) making appropriate choices between things that are and are not valued. One is expected to organize likes and preferences into a value system and then to decide which ones will be dominant</p> <p>5. Characterization by Value: All behavior displayed is consistent with one's value system. Values are integrated into a pervasive philosophy that never allows expressions that are out of character with those values. Evaluation at this level involves the extent to which one has developed a consistent philosophy of life (e.g., exhibits respect for the worth and dignity of human beings in all situations).</p>
Psychomotor Domain	<p>1. Imitation: The learner observes and then imitates an action. These behaviors may be crude and imperfect. The expectation that the individual is able to watch and then repeat an action.</p> <p>2. Manipulation: Performance of an action with written or verbal directions but without a visual model or direct observation. The action may be performed crudely or without neuromuscular coordination at this stage. Notice that the action verbs are the same as those for the imitation stage. The difference is that these actions are performed with the aid of written and verbal instruction, not visual demonstration.</p> <p>3. Precision: Requires performance of some action independent of either written instructions or a visual model. One is expected to reproduce an action with control and to reduce errors to a minimum.</p> <p>4. Articulation: Requires the display of coordination of a series of related acts by establishing the appropriate sequence and performing the acts accurately, with</p>

	control as well as with speed and timing. 5. Naturalization: High level of proficiency is necessary. The behavior is performed with the least expenditure of energy, becomes routine, automatic, and spontaneous.
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12. Program Educational Objectives (PEOs)

PEO1	Alumnae will team up with stakeholders in academia, government, and industry as highly skilled computer science engineering professionals.
PEO2	Graduates will use modern techniques, skills, and technologies to design and implement effective solutions to major engineering challenges such as software development, industrial automation, information technology and societal digitalization.
PEO3	Graduates will play a vital role to communicate effectively and work collaboratively to achieve sustainable development of the society by safeguarding the environment while upholding the ethical and moral values.
PEO4	Graduates will hold positions of leadership in industry and use their entrepreneurial, communication, and team management skills to launch businesses that provide new technical solutions to national and global challenges.

13. Program Learning Outcomes (PLOs)

PLO1	Engineering knowledge: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization respectively to the solution of complex engineering problems.
PLO2	Problem analysis: Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PLO3	Design/development of solutions: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PLO4	Investigation: Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PLO5	Modern tool usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
PLO6	The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex

	engineering problems.
PLO7	Environment and sustainability: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
PLO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO9	Individual work and teamwork: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PLO10	Communication: 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.
PLO11	Project management and finance: Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PLO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

14. Mapping Mission of the University with PEOs

Mission Code	PEO1	PEO2	PEO3	PEO4
UM1	✓			
UM2		✓		
UM3				✓
UM4		✓		✓
UM5	✓		✓	

15. Mapping PLOs with the PEOs

PEO/PL O	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
PEO1	✓	✓	✓		✓	✓				✓	✓	
PEO2	✓	✓	✓	✓	✓	✓						✓

PEO3							✓	✓	✓	✓		
PEO4		✓	✓	✓					✓	✓	✓	✓

16. Mapping Courses with the PLOs

BNQF Code	Course No.	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
1 st Year 1 st Semester													
0611	CSE 1111	C1	C2						C2				
0713	EEE 1111	C1	C2	C3									
0713	EEE 1112		C4		P2								
0533	Phy 1111	C2	C4	C3									
0533	Phy 1112	C2				P2							
0541	Math 1111	C1	C2	C3									
0232	Ban 1111	C2		P3				A5	A3				A2
1 st Year 2 nd Semester													
0613	CSE 1211	C1	C4	C6									
0613	CSE 1212				P2	P3							
0713	EEE 1211	C1	C2				C3						
0713	EEE 1212				C4	P4							
0531	Chem 1211	C1		C3			A6						
0531	Chem 1212				P2			A5					
0541	Math 1211	C1	C3	C3									
0232	Eng 1211	C2	C6	A1							A2		
2 nd Year 1 st Semester													
0714	CSE 2111			C1	C2			C6					
0714	CSE 2112						P2					A2	

0612	CSE 2121	C1	C2									C3	
0612	CSE 2122				P2	P4							
0612	CSE 2131	C1	C2	C3									
0612	CSE 2132				P4	P2							
0541 0542	Math 2111	C2	C3	C4									
0222	Hum 2111		C4		C4	C1						C1	C1
2 nd Year 2 nd Semester													
0612	CSE 2211	C2	C4	C4									A2
0612	CSE 2212				P3	P2							
0612	CSE 2221	C1	C2								A4		
0541	Math 2211	C2	C3	C4									
0541	Math 2212				P4	C4							
0541 0542	Stat 2211	C2	C2	C1									C3
0411 0412 0311	Hum 2211	C2	C3	C3									
3 rd Year 1 st Semester													
0613	CSE 3111	C1	C3		C4						C6		
0613	CSE 3112		P3					C6					
0612	CSE 3121	C1	C2						C3				
0612	CSE 3122				P3	P4							
0612	CSE 3131	C2	C2						C3				
0612	CSE 3141	C2	C4	C2									A1
0612	CSE 3142				P3	A2							
0413	Hum 3111							C1		C2	A3	A1	
3 rd Year 2 nd Semester													
0612	CSE 3200					C4							A4
0613	CSE 3211	C2	C4	C6									
0613	CSE 3212				P2	P3							
0611	CSE 3221	C2	C4										C3
0611	CSE 3222				P3						P4		
0612	CSE 3231	C2	C4	C3								C4	
0612	CSE 3232				P3			C6					
0613	CSE 3241	C2	C4	C5									

0613	CSE 3242				P2	P3								
0421	Hum 3211						C4		C3	C2			A3	
4 th Year 1 st Semester														
061	CSE 4000		C2	C3	C4	P2	A2	A5	A4	A2	A5	C5	A1	
0611	CSE 4111	C1	C2	C4										
0611	CSE 4112				P1	P2								
6313	CSE 4121	C1	C4	A5								C3		
6313	CSE 4122			P4							A2			
6312	CSE 4131	Elective I	C1	C2								C5		
6312	CSE 4132					P3		C6						
0613	CSE 4141		C1						C6					A3
0613	CSE 4142					P2	P1							
0611	CSE 4151		C2	C2	C4									
0611	CSE 4152					P2	P2							
0612	CSE 4161		C2	C4	C3					C6				
0612	CSE 4162							C6			A2			
0613	CSE 4171		C1	C2	C6									
0613	CSE 4172					P1	P2							
0613	CSE 4181		C1	C4	C3									
0613	CSE 4182					P1	P2							
0031 0413	Hum 4111					C3	P4	C2					A1	
4 th Year 2 nd Semester														
061	CSE 4000		C2	C3	C4	P2	A2	A5	A4	A2	A5	C5	A1	
0612	CSE 4200					P4	A5		C2					
0611	CSE 4211	C1	C2	C3										
0611	CSE 4212				P1	P2								
0613	CSE 4221	C2	C4	C3										
0613	CSE 4222				P4	P2								
0611	CSE 4231	Elective II	C1		C4				C6	A5				

0611	CSE 4232				P3					A2			
0611	CSE 4241	C2		C6				C6					
0611	CSE 4242				P3	P5							
0613	CSE 4251	C2		C3	C3				C2				
0613	CSE 4252					P2				A2			
0611	CSE 4261	C1	C2	C3							A2		
0611	CSE 4262					P4					A4		
0613	CSE 4271	C2			C3			C6					
0613	CSE 4272				P3	P4							
0714	CSE 4281	C1	C4	C6									
0714	CSE 4282	C1			P2								
*Level of Bloom's Cognitive Domain (C): Level 1 - Remember, Level 2 - Understand, Level 3 - Apply, Level 4 - Analyze, Level 5 - Evaluate, Level 6 - Create.													
*Level of Bloom's Psychomotor Domain (P): Level 1 - Imitation, Level 2 - Manipulation, Level 3 - Precision, Level 4 - Articulation, Level 5 - Naturalization.													
* Level of Bloom's Affective Domain (A): Level 1 - Receive, Level 2 - Respond, Level 3 - Value, Level 4 - Organization, Level 5 - Characterization by value.													

**BACHELOR OF SCIENCE IN
COMPUTER SCIENCE AND ENGINEERING (CSE)
Part-B**



**Faculty of Science and Engineering
Department of Computer Science and Engineering (CSE)
North Bengal International University**

17. Structure of the Curriculum

a) **Duration of the Program:** Years: 4 Semesters: 8

b) Admission Requirements:

The minimum qualifications for admission into the undergraduate program are:

- i. Higher Secondary Certificate (H.S.C) for its equivalent in Science with Mathematics, Physics, and Chemistry.
- ii. The O-A Level students must have an average grade of B, and also
- iii. Fulfilling any other conditions fixed by the authority.

c) **Total minimum credit requirement to complete the program: According to BNQF (Part B) for Higher Education:**

Minimum credit requirements for the award of Bachelor Degree will be recommended by the respective Academic Committee to the Academic Council.

d) Total class weeks in a Year/Semester:

Semester	Duration
Classes	14 weeks
For Midterm exam break	2 weeks
For Midterm Exam	2 weeks
For Final Exam Break	3 weeks
For Final Exam	2 weeks
Semester Break	3 weeks
Total Weeks for 6 months/bi-semester (14+2+2+3+2+3) = 26	

e) Minimum CGPA requirements for graduation:

The minimum CGPA requirements for obtaining a Bachelor Degree is 2.20.

f) Maximum Academic Years of Completion:

A student must complete his/her studies within a maximum period of seven years for 4-year bachelor degree.

g) Category of Courses:

- i. **General Education Courses:** General education courses refer to interdisciplinary courses, beyond B.Sc. in CSE program that provides well-rounded learning experience to the students of an academic program. Mathematics, Electricity, Optics, Waves & Modern Physics, chemistry and humanities courses such as economics, government, society, industrial management, accountancy and English belong to this type.

BNQF Code	Course Code	Course Title	Theory Hrs. / Week	Sessional Hrs. / Week	Credit
0232	Ban1111	Introduction to Bengali Language & Literature	4.00		4.00
0533	Phy 1111	Electricity, Optics, Waves & Modern Physics	3.00		3.00
0533	Phy 1112	Electricity, Optics, Waves & Modern Physics Sessional		2.00	1.00
0232	Eng 1211	Introduction to English Language & Literature	4.00		4.00
0531	Chem 1211	Physical and Inorganic Chemistry	3.00		3.00
0531	Chem 1212	Physical and Inorganic Chemistry Sessional		2.00	1.00
0413	Hum 3111	Normative and Meta Ethics	4.00		4.00
0421	Hum 3211	Introduction to Law	4.00		4.00
0222	Hum 2111	Bangladesh Studies	4.00		4.00
0411 0412 0311	Hum 2211	Financial Accounting & Economics	4.00		4.00
0031 0413	Hum 4111	Project Planning & Management	4.00		4.00
0541	Math 1111	Calculus and Complex Variable	3.00		3.00
0541	Math 1211	Algebra, Co-Ordinate Geometry and Vector Analysis	3.00		3.00
0541 0542	Math 2111	Linear Algebra, Matrices and Differential Equations	3.00		3.00
0541 0542	Stat 2211	Statistics for Engineers	4.00		4.00
0541	Math 2211	Numerical Analysis	3.00		3.00
0541	Math 2212	Numerical Analysis Sessional		2.00	1.00
0541	Math 1211	Algebra, Co-Ordinate Geometry and Vector Analysis	3.00		3.00
		Total Credits	53.00	6.00	56.00

BNQF Code	Course Code	Course Title	TheoryHrs. / Week	Sessional Hrs. / Week	Credit
0541	Math 1111	Calculus and Complex Variable	3.00		3.00
0541	Math 1211	Algebra, Co-Ordinate Geometry and Vector	3.00		3.00

		Analysis			
0541 0542	Math2111	Linear Algebra, Matrices and Differential Equations	3.00		3.00
0541 0542	Stat 2211	Statistics for Engineers	4.00		4.00
0541	Math 2211	Numerical Analysis	3.00		3.00
0541	Math 2212	Numerical Analysis Sessional		2.00	1.00
		Total Credits	16.00	2.00	17.00

ii. Related Engineering Courses:

BNQF Code	Course Code	Course Title	Theory Hrs. / Week	Sessional Hrs. / Week	Credit
0713	EEE 1111	Electrical Circuit	3.00		3.00
0713	EEE 1112	Electrical Circuit Sessional		2.00	1.00
0713	EEE1211	Basic Electronics Circuit	3.00		3.00
0713	EEE 1212	Basic Electronics Circuit Sessional		2.00	1.00
		Total Credits	6.00	4.00	8.00

iii. Core Courses: Core courses refer to the courses that characterize the discipline, CSEE. All the CSE courses belong to this category.

BNQF Code	Course Code	Course Title	Theory Hrs. / Week	Sessional Hrs. / Week	Credit
0611	CSE 1111	Fundamental of Computer Systems	3.00		3.00
0613	CSE1211	Programming Technology with C	3.00		3.00
0613	CSE1212	Programming Technology with C Sessional		2.00	1.00
0714	CSE 2111	Digital Systems	3.00		3.00
0714	CSE 2112	Digital Systems Sessional		2.00	1.00
0612	CSE2121	Object Oriented Programming	3.00		3.00
0612	CSE2122	Object Oriented Programming Sessional		2.00	1.00
0612	CSE2131	Data Structure	3.00		3.00
0612	CSE2132	Data Structure Sessional		2.00	1.00
0612	CSE 2211	Analysis of Algorithms	3.00		3.00
0612	CSE 2212	Analysis of Algorithms Sessional		2.00	1.00
0613	CSE 2221	Management Information Systems	3.00		3.00

0613	CSE 3111	Artificial Intelligence	3.00		3.00
0613	CSE 3112	Artificial Intelligence Sessional		2.00	1.00
0612	CSE 3121	Database Management Systems	3.00		3.00
0612	CSE 3122	Database Management Systems Sessional		2.00	1.00
0612	CSE 3131	Discrete Mathematics	3.00		3.00
0612	CSE 3141	Computer Architecture and Organization	3.00		3.00
0612	CSE 3142	Computer Architecture and Organization Sessional		2.00	1.00
0613	CSE 3211	Digital Signal Processing	3.00		3.00
0613	CSE 3212	Digital Signal Processing Sessional		2.00	1.00
0611	CSE 3221	Microprocessor and Assembly Language	3.00		3.00
0611	CSE 3222	Microprocessor and Assembly Language Sessional		2.00	1.00
0612	CSE 3231	Computer Networks	3.00		3.00
0612	CSE 3232	Computer Networks Sessional		2.00	1.00
0613	CSE 3241	Operating Systems	3.00		3.00
0613	CSE 3242	Operating Systems Sessional		2.00	1.00
0611	CSE 4111	Compiler Design	3.00		3.00
0611	CSE 4112	Compiler Design Sessional		2.00	1.00
0613	CSE 4121	Software Engineering	3.00		3.00
0613	CSE 4122	Software Engineering Sessional		2.00	1.00
0612	CSE 4211	Computer Peripherals and Interfacing	3.00		3.00
0612	CSE 4212	Computer Peripherals and Interfacing Sessional		2.00	1.00
0613	CSE 4221	Neural Network and Fuzzy System	3.00		3.00
0613	CSE 4222	Neural Network and Fuzzy System Sessional		2.00	1.00
		Total Credits	57.00	32.00	73.00

- iv. **Elective Courses:** Elective courses refer to the courses that characterize the discipline, EEE. At least a single course must be included in the course plan from this category.

Elective I

BNQF Code	Code	Course Title	Hrs/week	Credit
6312	CSE4131	Wireless Communication and Networks	3.00	3.00
6312	CSE4132	Wireless Communication and Networks Sessional	2.00	1.00
0613	CSE4141	Digital Image Processing	3.00	3.00
0613	CSE4142	Digital Image Processing Sessional	2.00	1.00
0611	CSE4151	Parallel and Distributed Computing	3.00	3.00
0611	CSE4152	Parallel and Distributed Computing Sessional	2.00	1.00
0612	CSE4161	Internet & Web Technology	3.00	3.00
0612	CSE4162	Internet & Web Technology Sessional	2.00	1.00
0613	CSE4171	Computational Geometry	3.00	3.00
0613	CSE4172	Computational Geometry Sessional	2.00	1.00
0613	CSE4181	Computer Graphics	3.00	3.00
0613	CSE4182	Computer Graphics Sessional	2.00	1.00

Elective II

BNQF Code	Code	Course Title	Hrs/week	Credit
0611	CSE 4231	System Analysis and Design	3.00	3.00
0611	CSE 4232	System Analysis and Design Sessional	2.00	1.00
0613	CSE4241	Computer Simulation and Modeling	3.00	3.00
0613	CSE4242	Computer Simulation and Modeling Sessional	2.00	1.00
0611	CSE4251	Multimedia Systems	3.00	3.00
0611	CSE4252	Multimedia Systems Sessional	2.00	1.00
0613	CSE4261	E-Commerce	3.00	3.00
0613	CSE4262	E-Commerce Sessional	2.00	1.00
0613	CSE4271	Distributed Database Management Systems	3.00	3.00
0613	CSE4272	Distributed Database Management Systems Sessional	2.00	1.00
0611	CSE4281	Design of VLSI Circuits and Systems	3.00	3.00
0611	CSE4282	Design of VLSI Circuits and Systems Sessional	2.00	1.00

- v. **Capstone course/Internship/Thesis/Projects/Portfolio:**

BNQF Code	Course Code	Course Title	Theory Hrs. / Week	Sessional Hrs. / Week	Credit
0612	CSE 3200	Seminar		2.00	1.00
0612	CSE 4000	Project & Thesis		12.00	6.00
0612	CSE 4200	Industrial Training		6.00	3.00
		Total Credits		20.00	10.00

18. Year /Semester wise distribution of courses

Summary of undergraduate course plan

Sl.	Semester	Theory		Sessional		Total Credits
		No. of Course	Credits	No. of Course	Credits	
1	1 st year 1 st semester	5	16.00	2	2.00	18.00
2	1 st year 2 nd semester	5	16.00	3	3.00	19.00
3	2 nd year 1 st semester	5	16.00	3	3.00	19.00
4	2 nd year 2 nd semester	5	17.00	2	2.00	19.00
5	3 rd year 1 st semester	5	16.00	3	3.00	19.00
6	3 rd year 2 nd semester	5	16.00	5	5.00	21.00
7	4 th year 1 st semester	5	16.00	5	6.00	22.00
8	4 th year 2 nd semester	4	12.00	6	11.00	23.00
Total		39	125.00	29	35.00	160.00

1st Year, 1st Semester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0611	CSE 1111	Fundamental of Computer Systems	3	3			3.00
2	0713	EEE 1111	Electrical Circuit	3	3			3.00
3	0713	EEE 1112	Electrical Circuit Sessional			2	1	1.00
4	0533	Phy 1111	Electricity, Optics, Waves & Modern Physics	3	3			3.00
5	0533	Phy 1112	Electricity, Optics, Waves & Modern Physics Sessional			2	1	1.00
6	0541	Math 1111	Calculus and Complex Variable	3	3			3.00
7	0232	Ban 1111	Introduction to Bengali Language & Literature	4	4			3.00
Total				16	16	4	2	18.00

1st Year, 2nd Semester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0613	CSE1211	Programing Technology with C	3	3			3.00
2	0613	CSE1212	Programing Technology with C Sessional			2	1	1.00
3	0713	EEE1211	Basic Electronics Circuit	3	3			3.00
4	0713	EEE 1212	Basic Electronics Circuit Sessional			2	1	1.00
5	0531	Chem 1211	Physical and Inorganic Chemistry	3	3			3.00
6	0531	Chem 1212	Physical and Inorganic Chemistry Sessional			2	1	1.00
7	0541	Math1211	Algebra, Co-ordinate Geometry and Vector Analysis	3	3			3.00
8	0232	Eng1211	Introduction to English Language & Literature	4	4			4.00
Total				16	16	6	3	19.00

2nd Year, 1st Semester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0714	CSE 2111	Digital Systems	3	3			3.00
2	0714	CSE 2112	Digital Systems Sessional			2	1	1.00

3	0612	CSE2121	Object Oriented Programming	3	3			3.00
4	0612	CSE2122	Object Oriented Programming Sessional			2	1	1.00
5	0612	CSE2131	Data Structure	3	3			3.00
6	0612	CSE2132	Data Structure Sessional			2	1	1
7	0541 0542	Math2111	Linear Algebra, Matrices and Differential Equations	3	3			3.00
8	0222	Hum2111	Bangladesh Studies	4	4			4.00
Total				20	16	6	3	19.00

2nd Year, 2nd Semester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0612	CSE2211	Analysis of Algorithms	3	3			3.00
2	0612	CSE2212	Analysis of Algorithms Sessional			2	1	1.00
3	0612	CSE 2221	Management Information Systems	3	3			3.00
4	0541	Math 2211	Numerical Analysis	3	3			3.00
5	0541	Math 2212	Numerical Analysis Sessional			2	1	1.00
6	0541 0542	Stat 2211	Statistics for Engineers	4	4			4.00
7	0411 0412 0311	Hum 2211	Financial Accounting & Economics	4	4			4.00
Total				17	17	4	2	19.00

3rdYear, 1stSemester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0613	CSE3111	Artificial Intelligence	3	3			3.00
2	0613	CSE3112	Artificial Intelligence Sessional			2	1	1.00
3	0612	CSE3121	Database Management Systems	3	3			3.00
4	0612	CSE3122	Database Management Systems Sessional			2	1	1.00
5	0612	CSE 3131	Discrete Mathematics	3	3			3.00
6	0612	CSE3141	Computer Architecture and Organization	3	3			3.00
7	0612	CSE3142	Computer Architecture and Organization Sessional			2	1	1.00
8	0413	Hum 3111	Normative and Meta Ethics	4	4			4.00
Total				16	16	6	3	19.00

3rdYear, 2ndSemester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0612	CSE 3200	Seminar			2	1	1.00
2	0613	CSE 3211	Digital Signal Processing	3	3			3.00
3	0613	CSE 3212	Digital Signal Processing Sessional			2	1	1.00

4	0611	CSE 3221	Microprocessor and Assembly Language	3	3			3.00
5	0611	CSE 3222	Microprocessor and Assembly Language Sessional			2	1	1.00
6	0612	CSE 3231	Computer Networks	3	3			3.00
7	0612	CSE 3232	Computer Networks Sessional			2	1	1.00
8	0613	CSE 3241	Operating Systems	3	3			3.00
9	0613	CSE 3242	Operating Systems Sessional			2	1	1.00
10	0421	Hum 3211	Introduction to Law	4	4			4.00
Total				16	16	8	5	21.00

4thYear, 1stSemester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0612	CSE 4000	Thesis or Project (Part I)			4	2	2.00
2	0611	CSE 4111	Compiler Design	3	3			3.00
3	0611	CSE 4112	Compiler Design Sessional			2	1	1.00
4	6313	CSE 4121	Software Engineering	3	3			3.00
5	6313	CSE 4122	Software Engineering Sessional			2	1	1.00
6	****	CSE 41**	Elective I	3	3			3.00
7	****	CSE 41**	Elective I Sessional			2	1	1.00
8	****	CSE 41**	Elective I	3	3			3.00
9	****	CSE 41**	Elective I Sessional			2	1	1.00

10	0031 0413	Hum 4111	Project Planning & Management	4	4			4.00
Total				16	16	12	6	22.00

Elective Courses: I
Three courses with sessional will be selected from the following

BNQF Code	Code	Course Title	Hrs/week	Credit
6312	CSE4131	Wireless Communication and Networks	3	3.00
6312	CSE4132	Wireless Communication and Networks Sessional	2	1.00
0613	CSE4141	Digital Image Processing	3	3.00
0613	CSE4142	Digital Image Processing Sessional	2	1.00
0611	CSE4151	Parallel and Distributed Computing	3	3.00
0611	CSE4152	Parallel and Distributed Computing Sessional	2	1.00
0612	CSE4161	Internet & Web Technology	3	3.00
0612	CSE4162	Internet & Web Technology Sessional	2	1.00
0613	CSE4171	Computational Geometry	3	3.00
0613	CSE4172	Computational Geometry Sessional	2	1.00
0613	CSE4181	Computer Graphics	3	3.00
0613	CSE4182	Computer Graphics Sessional	2	1.00

4thYear, 2ndSemester

Sl. No	BNQF Code	Course No.	Course Title	Theory		Sessional		Total Credits
				Contact Hrs/week	Credits	Contact Hrs/week	Credits	
1	0612	CSE 4000	Thesis or Project (Part II)			8	4	4.00
2	0612	CSE4200	Industrial Training			3	3	3.00
3	0611	CSE 4211	Computer Peripherals and Interfacing	3	3			3.00
4	0611	CSE 4212	Computer Peripherals and Interfacing			2	1	1.00
5	0613	CSE 4221	Neural Network and Fuzzy System	3	3			3.00
6	0613	CSE 4222	Neural Network and Fuzzy System Sessional			2	1	1.00

7	****	CSE 42**	Elective II	3	3			3.00
8	****	CSE 42**	Elective II Sessional			2	1	1.00
9	****	CSE 42**	Elective II	3	3			3.00
10	****	CSE42**	Elective II Sessional			2	1	1.00
Total				12	12	19	11	23.00

Elective Courses: II

Three courses with sessional will be selected from the following

BNQF Code	Code	Course Title	Hrs/week	Credit
0611	CSE 4231	System Analysis and Design	3	3.00
0611	CSE 4232	System Analysis and Design Sessional	2	1.00
0613	CSE 4241	Computer Simulation and Modeling	3	3.00
0613	CSE 4242	Computer Simulation and Modeling Sessional	2	1.00
0611	CSE 4251	Multimedia Systems	3	3.00
0611	CSE 4252	Multimedia Systems Sessional	2	1.00
0613	CSE 4261	E-Commerce	3	3.00
0613	CSE 4262	E-Commerce Sessional	2	1.00
0613	CSE 4271	Distributed Database Management Systems	3	3.00
0613	CSE 4272	Distributed Database Management Systems Sessional	2	1.00
0611	CSE 4281	Design of VLSI Circuits and Systems	3	3.00
0611	CSE 4282	Design of VLSI Circuits and Systems Sessional	2	1.00

**BACHELOR OF SCIENCE IN
COMPUTER SCIENCE AND ENGINEERING (CSE)
Part-C**



**Faculty of Science and Engineering
Department of Computer Science and Engineering (CSE)
North Bengal International University**

19. Description of all courses of the program including the following information for each course:

Core Courses:

Course Code: CSE 1111

Contact Hours/Week: 3 Hours

Course Title: Fundamental of Computer System

Credits:3

Prerequisite: None.

Course Rationale:

To present with the foremost later innovation and to instruct understudies the fundamental concepts of computer system computer programming.

Course Content:

Computer Basics: Introduction to Studying Computers, History and development of Computers, Generation of Computers, Types of Computers. Computer Hardware and Peripherals: Basic Units of Computer Hardware, Keyboard, Mouse, Internal structure of CPU, Functions of RAM, ROM and Cache memory, Basic functional mechanism of HDD and CD-ROM, Different types of Monitors, Impact and Non-impact Printers, Scanner, Plotter, Typical Computer specifications. Software: Classifications, System software, Operating system concepts and importance, components and basic functions of DOS, Windows operating system, Application software's and Utility programs, Computer Virus. Data Processing: Concepts of Data, Information, and Database, Traditional File Processing, and DBMS. Computer Networks: Computer networks and its goals, Basic concepts on LAN, MAN, WAN and Internet systems, Internet services, Functions of Modem in Internet. Cyber Crime; Cyber vandalism, Hacking, Malicious Spreading in Viruses, Password fraud, Cheating, Cyber Pornography, Child Pornography, Protection of Copyrights and Intellectual Property right. Invasion of Privacy, Constitutional basis of Privacy, Unsolicited E-Mail, Defamation, Harassment and e-Mail Abuse, Present Legal Protection;

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Recognize the most-up-to-date innovation in an ever-changing teach.	C1											
CLO2	Illustrate the basics of computers and computer terminology, especially with regard to individual computer equipment and computer program.		C2										

Course Code: CSE 1211
Course Title: Programming Technology with C
Prerequisite: None

Contact Hours/Week: 3 Hours
Credit Hour: 3

Course Rationale:

The programming course covers a comprehensive introduction to a structured programming language, emphasizing transportability and clear the pathway towards the problem-solving skills. To introduce the fundamental principles, mechanism of programming skills and develop basic programming knowledge to program design and development. This course assists students in developing abilities to address real-world community issues.

Course Content:

Introduction: Programming languages, basic concepts of compiler, interpreter, algorithm and flowchart. Simple C: Program structure in C, Program creating, compiling, debugging and running, Basic I/O functions, Identifiers and keywords, Simple data types, variables, constants, operators, Bitwise operators, comments, Decision making statements with if and switch, looping structures with for, while, do-while. More Data Types: Array, Structures, Union, Pointers, Strings, Dynamic allocation, Static, global, external and registrar, User defined data types Functions: C Functions and user defined function, Function types, parameters, prototypes, Recursive function. File Handling: Concepts, Character and File I/O, Basics of simple File I/O, ANSI Standard Libraries. Others: Pre-processor with define, include, macro, ifdef, Uses of graphics functions.

Course Learning Outcome (CLOS) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Recognize the Fundamentals of computer programming with C.	C1											
CLO2	Illustrate the concept of various tokens and different data types operators, conditional and iterative statements and their applications		C4										
CLO3	Develop basic programming skills with respect to program design and development.			C6									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Kernighan and Ritchie	The C Programming Language, <i>Prentice Hall</i>	Link is provided in Google Class Room
2.	Gotfreid	Programming with C, Schaum's Outline Series, <i>Tata McGraw Hill</i>	Link is provided in Google Class Room
3.	D.E. Knuth	The Art of Computer Programming, <i>Addison-Wesley Professional</i>	Link is provided in Google Class Room
4.	E. Balagurusamy	Programming with ANSI C, <i>Tata McGraw Hill</i>	Link is provided in Google Class Room
5.	H. Schildt	Teach yourself C, <i>McGraw-Hill Publishers</i>	Link is provided in Google Class Room

Course Code: CSE 1212

Contact Hours/Week: 2 Hours

Course Title: Programming Technology with C Sessional

Credit Hour: 1

Prerequisite:None

Course Rationale:

Computer programming has evolved into one of the most efficient and effective methods of solving mathematical and engineering problems. Students majoring in Computer Science and Engineering must improve their skills in designing efficient algorithms as well as developing and evaluating computer programs. This course is essential for enhancing problem-solving and problem-analysis skills

Course Content:

Introduction to Computer Programming: Compiler, Interpreter, Flow chart design, Writing, Debugging and running programs using C/C++.C Basics: Different data types and variables, Operator and operands and its precedence, Input/Output, Conditional operators, Loop structures, Error handling, and Built-in functions.Functions and Arrays: Writing & calling of user defined functions, Recursive functions, Introduction to one-dimensional arrays, multi-dimensional arrays and array manipulation.Pointers and Strings: Introduction to pointers, Pointers and array, Pointers and functions, Scope of variables, Dynamic memory allocation, String I/O, String-based built-in functions, String operations, Pointer and string.Files: Introduction to files in C, Opening, Closing and updating binary and sequential files.

Advanced Topics: Structure, Union, Enumeration, Bit fields, Operations on bits, Register variable, Pre-processors and graphics in C.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Practically analyze the fundamental principles, typical characteristics and mechanisms of a structured programming language.				P2								
CLO2	Apply practical knowledge to develop basic programming skills with respect to program design and development					P3							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 2111

Contact Hours/Week: 3 Hours

Course Title: Digital Systems

Credit Hour: 3.0

Prerequisite:EEE 1111, EEE 1211

Course Rationale:

This course is important to know the fundamental knowledge, solutions techniques and different practical applications of digital logic circuits and programmable logic devices. However, it can evaluate the performance of logic devices and also analysis the sequential circuit. After studying this course, students will be able to analyze various digital logic circuits which are the fundamentals for an electronic engineer.

Course Content:

Analysis and Synthesis of Digital Logic Circuits: Number system, codes, and conversion. Boolean algebra, De Morgan's law, logic gates and truth tables, combinational logic design, minimization techniques, implementation of basic static logic gates in CMOS and BiCMOS. Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and combinational circuit design. Programmable Logic Devices: Logic arrays, Field Programmable Logic Arrays and Programmable Read Only Memory. Sequential Circuits: Different types of latches, flip-flops and their design using ASM approach, timing analysis, timing analysis and power optimization of sequential circuits. Modular sequential logic circuit design: Shift registers, counters and their applications.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs):

CLO No.	CLO Statements	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Recognize different numbering system, codes, logics gates and logic circuit to solve digital logic circuit problems		C1										
CLO2	Understand various programmable logic devices and their applications.			C2									
CLO3	Design different types of latches and flip-flops for development of society.						C6						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment

		<input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	M.T. Ozsu and P. Valduriez	Principles of Distributed Database Systems, <i>Pearson</i> .	Link is provided in Google Class Room
2.	S. Ceri and G. Pelagatti	Distributed Databases principles and systems, <i>Tata McGraw Hill</i>	Link is provided in Google Class Room
3.	Andrew S. Tanenbaum	Distributed Database, <i>Pearson</i> .	Link is provided in Google Class Room

Course Code: CSE 2112

Contact Hours/Week: 2 Hours

Course Title: Digital Systems Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is designed to teach about practical experiments on fundamental concepts of digital logic circuits, logic device, and different sequential circuits.

Course Content:

Analysis and Synthesis of Digital Logic Circuits: Number system, codes, and conversion. Boolean algebra, De Morgan's law, logic gates and truth tables, combinational logic design, minimization techniques, implementation of basic static logic gates in CMOS and BiCMOS. Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and combinational circuit design. Programmable Logic Devices: Logic arrays, Field Programmable Logic Arrays and Programmable Read Only Memory. Sequential Circuits: Different types of latches, flip-flops and their design using ASM approach, timing analysis, timing analysis and power optimization of sequential circuits. Modular sequential logic circuit design: Shift registers, counters and their applications.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	CLO Statements	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Perform different types of experiments with logic circuits in laboratory.					P2							
CLO2	Examine logic devices using logic gates and flip flops by taking help from group members.										A2		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Affective (Respond)	<input type="checkbox"/> Lab Experiments <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE2121
Course Title: Object Oriented Programming

Contact Hours/Week: 3
Hours
Credit Hour: 3

Prerequisite: CSE1211

Course Rationale:

The course begins with the basic of object-oriented programming language. The course will give in depth idea object-oriented programming structures like class, object, constructor, destructor, abstraction, inheritance, polymorphism, encapsulation and other advanced topics like virtual function, template and exception handling, file handling. By learning this course students will get a concrete idea on object-oriented programming structure.

Course Content:

Introduction: Object oriented programming and procedural oriented programming, encapsulation, inheritance, polymorphism, data abstraction, data binding, static and dynamic binding, message passing. Object-oriented language: Declaration and constants, expression and statements, data types, operator, Functions. Classes: structure of classless. public, private and protected members, array of object, argumented member function, and non-augmented objects, nested member class and their object, pointer objects and pointer members, object argument of function, static class member and static class. Friend function, friend class. Inheritance: mode of inheritance, classifications of inheritance, virtual inheritance. Array of objects of derived class. Constructor and destructors: default constructor, argumented constructor, copy constructor, dynamic constructor, constructor function for derived class and their order of execution, destructor. Operator and function overloading: unary and binary operator overloading, run-time and compile time polymorphism, object pointer and pointer to an object, virtual function, dynamic binding. Data file: File stream classes, input and output file, mode of files, file pointer, random file accessing, Template and Exception handling: function template and class template, Exception Handling.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe basic object-oriented programming structure	C1											
CLO2	Explain in-depth knowledge on object-oriented features.		C2										
CLO3	Apply Object-oriented features (class, object, inheritance, polymorphism, constructor, destructor, operator and function overloading) to solve real life problem through a project.											C3	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	H. Schidt	C++: A Beginner's Guide, McGraw Hill, C++: The Complete Reference, McGraw Hill	Link is provided in Google Class Room
2.	N. Barkakati	Object Oriented Programming with C++, Prentice Hall India	Link is provided in Google Class Room
3.	Deitel&Deitel	Java How to Program, Prentice Hall	Link is provided in Google Class Room
4.	Flanagan	Java in a nutshell: a desktop quick reference	Link is provided in Google Class Room

Course Code: CSE2122

Course Title: Object Oriented Programming Sessional

Contact Hours/Week: 2

Hours

Credit Hour: 1

Prerequisite:None

Course Rationale:

In this course the students will learn the implementation of object-oriented language and they will be able to get in-depth idea on how to implement different functionalities of object-oriented programming like class, object, constructor, destructor, abstraction, inheritance, polymorphism, encapsulation and other advanced topics like virtual function, template and exception handling, file handling.

Course Content:

Introduction: Object oriented programming and procedural oriented programming, encapsulation, inheritance, polymorphism, data abstraction, data binding, static and dynamic binding, message passing. Object-oriented language: Declaration and constants, expression and statements, data types, operator, Functions. Classes: structure of classless. public, private and protected members, array of object, argumented member function, and non-augmented objects, nested member class and their object, pointer objects and pointer members, object argument of function, static class member and static class. Friend function, friend class. Inheritance: mode of inheritance, classifications of inheritance, virtual inheritance. Array of objects of derived class. Constructor and destructors: default constructor, argumented constructor, copy constructor, dynamic constructor, constructor function for derived class and their order of execution, destructor. Operator and function overloading: unary and binary operator overloading, run-time and compile time polymorphism, object pointer and pointer to an object, virtual function, dynamic binding. Data file: File stream classes, input and output file, mode of files, file pointer, random file accessing, Template and Exception handling: function template and class template, Exception Handling.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Implement basic object-oriented programming structure				P2								
CLO2	Develop in-depth knowledge on object-oriented features to solve real life problem					P4							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project

		<input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
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Course Code: CSE2131

Contact Hours/Week: 3 Hours

Course Title: Data Structure

Credit Hour: 3

Prerequisite: CSE1211, CSE2121

Course Rationale:

Data structure is one of the most essential and fundamental part of computer science. Data structure help in understanding the nature of problem at a deeper level which will help the students to understand programming structure briefly. It will help them to build up their programming logic stronger and will help them to understand how to organized data in an efficient manner.

Course Content:

Arrays: Maximization, ordered lists, sparse matrices, representation of arrays. Stacks, Queues and Recursion: Different types of stacks and queues: Circular, dequeues, etc.; evaluation of expressions, multiple stacks and queues; Recursion: Direct and indirect recursion, depth of recursion; Simulation of Recursion, Removal of recursion; Towers of Hanoi. Links Lists: singly linked lists, linked stacks and queues, the storage pool, polynomial addition, equivalence relations, sparse matrices, doubly linked lists and dynamic storage management, generalized lists, garbage collection and compaction. Trees: Basic terminology, binary trees, binary tree representations, binary tree traversal; Extended binary trees: 2-trees, internal and external path lengths, Huffman codes/algorithms; threaded binary trees, binary tree representation of trees; Application of Trees: Set representation, decision trees, games trees: Counting binary trees. Graphs: Introduction, definitions and terminology, graph representations, traversals, connected components and spanning trees, shortest path and transitive closure, activity networks, topological sort and critical paths, enumerating all paths. Symbol Tables: static tree tables, dynamic tree tables; Hash Tables: Hashing functions overflow handling, theoretical evaluation of overflow techniques. Files: file, queries and sequential organizations: Indexing Techniques: Cylinder-surface indexing hashed indexes, tree indexing-B-trees; Tree indexing.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe basic concept on data structure.	C1											
CLO2	Discuss in-depth knowledge on different ways of organizing data in efficient manner		C2										
CLO3	Write down efficient code			C3									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	E. Horowitz and S. Sahni	Fundamentals of Data Structures, <i>Galgotia.</i>	Link is provided in Google Class Room
2.	Edward M. Reingold&Wilfred J. Hansen	Data Structures, <i>Addison Wesley Publishers</i>	Link is provided in Google Class Room
3.	Niklaus Wirth	Algorithms + Data Structures = Programs, <i>Prentice Hall</i>	Link is provided in Google Class Room
4.	Robert L. Kruse	Data Structures and Program Design, <i>Prentice Hall</i>	Link is provided in Google Class Room
5.	Seymour Lipshultz	Data Structures (Schaum's Outline Series), <i>Tata McGraw-Hill</i>	Link is provided in Google Class Room

Course Code: CSE 2132
Course Title: Data Structure Sessional

Contact Hours/Week: 2 Hours
Credit Hour: 1

Prerequisite: None

Course Rationale:

The aim of this course is to make the students familiar with different data organizing strategies with help of some well-known algorithms as well as develop a knowledge about nature of problem at a deeper level which will help the students to understand programming structure briefly. It will help them to build up their programming logic stronger and will help them to understand how to organized data in an efficient manner.

Course Content:

Arrays: Maximization, ordered lists, sparse matrices, representation of arrays. Stacks, Queues and Recursion: Different types of stacks and queues: Circular, dequeues, etc.; evaluation of expressions, multiple stacks and queues; Recursion: Direct and indirect recursion, depth of recursion; Simulation of Recursion, Removal of recursion; Towers of Hanoi. Links Lists: singly linked lists, linked stacks and queues, the storage pool, polynomial addition, equivalence relations, sparse matrices, doubly linked lists and dynamic storage management, generalized lists, garbage collection and compaction. Trees: Basic terminology, binary trees, binary tree representations, binary tree traversal; Extended binary trees: 2-trees, internal and external path lengths, Huffman codes/algorithms; threaded binary trees, binary tree representation of trees; Application of Trees: Set representation, decision trees, games trees: Counting binary trees. Graphs: Introduction, definitions and terminology, graph representations, traversals, connected components and spanning trees, shortest path and transitive closure, activity networks, topological sort and critical paths, enumerating all paths. Symbol Tables: static tree tables, dynamic tree tables; Hash Tables: Hashing functions overflow handling, theoretical evaluation of overflow techniques. Files: file, queries and sequential organizations: Indexing Techniques: Cylinder-surface indexing hashed indexes, tree indexing-B-trees; Tree indexing.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Implement data structure related algorithms					P2							
CLO2	Develop in-depth knowledge on different ways of organizing data in efficient manner				P4								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 2211

Contact Hours/Week: 3 Hours

Course Title: Analysis of Algorithms

Credit Hour: 3

Prerequisite: CSE 1211, CSE 2121, CSE 2131

Course Rationale:

The aim of this course is to make the students familiar with different algorithm designing strategies, asymptotic notations, time complexity, space complexity. They will be able to implement some well-known algorithms as well as develop a knowledge about NP-complete, NP hard problems.

Course Content:

Arrays: Maximization, ordered lists, sparse matrices, representation of arrays. Stacks, Queues and Recursion: Different types of stacks and queues: Circular, dequeues, etc.; evaluation of expressions, multiple stacks and queues; Recursion: Direct and indirect recursion, depth of recursion; Simulation of Recursion, Removal of recursion; Towers of Hanoi. Links Lists: singly linked lists, linked stacks and queues, the storage pool, polynomial addition, equivalence relations, sparse matrices, doubly linked lists and dynamic storage management, generalized lists, garbage collection and compaction. Trees: Basic terminology, binary trees, binary tree representations, binary tree traversal; Extended binary trees: 2-trees, internal and external path lengths, Huffman codes/algorithms; threaded binary trees, binary tree representation of trees; Application of Trees: Set representation, decision trees, games trees: Counting binary trees. Graphs: Introduction, definitions and terminology, graph representations, traversals, connected components and spanning trees, shortest path and transitive closure, activity networks, topological sort and critical paths, enumerating all paths. Symbol Tables: static tree tables, dynamic tree tables; Hash Tables: Hashing functions overflow handling, theoretical evaluation of overflow techniques. Files: file, queries and sequential organizations: Indexing Techniques: Cylinder-surface indexing hashed indexes, tree indexing-B-trees; Tree indexing.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PL01	PL02	PL03	PL04	PL05	PL06	PL07	PL08	PL09	PL010	PL011	PL012
CLO1	Explain basic concepts related to algorithms (i.e., asymptotic notations, time complexity, space complexity).	C2											
CLO2	Analyzedifferent algorithm designing strategies.		C4										
CLO3	Solve problems using suitable algorithms and analyze the efficiency of it.			C4									
CLO4	Examine different algorithmic strategies and apply them to solve real life problems strategically												A2

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Affective (Respond)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video	<input type="checkbox"/> Class Test <input type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation

		<input type="checkbox"/> Others	<input type="checkbox"/> Project <input type="checkbox"/> Others
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References

SL No	Author	Text Book/Reference Book(s)	Online Availability
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	Introduction to Algorithms, <i>The MIT Press</i>	Link is provided in Google Class Room
2.	D. E. Knuth	The Art of Computer Programming, Vol. 1, 2, 3, <i>Addison-Wesley</i> .	Link is provided in Google Class Room
5.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran	Fundamentals of Computer Algorithms, <i>Galgotia Publications</i>	Link is provided in Google Class Room

Course Code: CSE 2212

Contact Hours/Week: 2 Hours

Course Title: Analysis of Algorithms Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

The aim of this course is to implement different types of algorithms such as sorting, searching and many more advanced algorithms. It will enable the students to choose a suitable algorithm for solving a particular problem.

Course Content:

Basics of Algorithm: Algorithms as a technology, analyzing algorithms, Designing algorithms, Time and space analysis of algorithms, Average, best- and worst-case analysis, different notations. Sorting: Insertion sort, Heapsort, Quicksort, Counting sort, Radix sort, Bucket sort. Dynamic programming: Assembly-line scheduling, Matrix-chain multiplication, longest common subsequence, Optimal binary search trees. Greedy method: An activity-selection problem, Elements of the greedy strategy, Huffman codes. Graph algorithms: Depth-first search, Breadth-first search, Topological sort, Minimum spanning tree, Kruskal's and Prim's algorithm, Bellman-Ford algorithm, Dijkstra's algorithm, Floyd-Warshall algorithm, Johnson's algorithm for sparse graphs, Ford-Fulkerson method. Computational Geometry: Line-segment properties, determining whether any pair of segments intersects, Finding the convex hull, Finding the closest pair of points. Backtracking: 8 queens' problem, Sum of subsets, Graph coloring problem, Hamilton cycles. Branch and bound: Least cost search, 15-puzzle problem, Knapsack problem, Traveling salesman problem. NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-complete problems.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstratedifferent algorithm designing strategies.				P3								
CLO2	Implementvarious algorithms using different techniques.					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4231

Contact Hours/Week: 3 Hours

Course Title: System Analysis and Design

Credit Hour: 3

Prerequisite: None

Course Rationale:

This course propels to see data frameworks arranging, investigation, plan and usage; graphical strategies for speaking to data structure, commonsense plan strategies, database plan and prototyping; communication abilities, extend administration to unravel different genuine life issues.

Course Content:

Introduction: Introduction to information systems, general design consideration of information systems. Overview: system concepts and the information systems environment, information needs, the concepts of MIS, the system development life cycle, the role of the systems analysis. Systems Analysis: Systems planning and the initial investigation, information gathering, the tools of structured analysis, feasibility study, cost benefit analysis. Systems Design: The process and stages of systems design, input/output and forms design, file organization and data base design. System Implementation: system testing and quality assurance, implementation and software maintenance, hardware/software selection, project scheduling and software, Security, disaster/recovery, and ethics in system development. Case study: Case studies of various information systems such as: Library management system, inventory system, voter identity management system, payroll system, etc.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Recognize with an impression of different methods for requirement gathering.	C1											
CLO2	Analyze diverse data frameworks for diverse genuine life organizational setting.			C4									
CLO3	Pursue the moral and security contemplations of a data framework.								A5				
CLO4	Propose a system which will help to achieve sustainable development strategies that relates the societal and environmental context.							C6					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Affective (Characterization)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Text Book/Reference Book(s)	Author(s)	Online Availability
1.	E.M. Awad	System Analysis and Design, <i>Galgotia Publication Ltd</i>	Link is provided in Google Class Room
2.	P. Edwards	System Analysis	Link is provided in

		&Design, <i>McGraw-Hill</i>	Google Class Room
3.	J.G. Burch Jr., F.R. Strater and G. Grundnitski	Information Systems: Theory and Practice, <i>John Wiley & Sons.</i>	Link is provided in Google Class Room
4.	G. Scott.	Principles of Management Information Systems, <i>McGraw-Hill</i>	Link is provided in Google Class Room
5.	A. Daniels and D. Yeates	Basic System Analysis, <i>Galgottia</i>	Link is provided in Google Class Room
6.	E.M. Awad	System Analysis and Design, <i>Galgotia Publication Ltd</i>	Link is provided in Google Class Room
7.	P. Edwards	System Analysis &Design, <i>McGraw-Hill</i>	Link is provided in Google Class Room
8.	J.G. Burch Jr., F.R. Strater and G. Grundnitski	Information Systems: Theory and Practice, <i>John Wiley & Sons.</i>	Link is provided in Google Class Room

Course Code: CSE 4232

Contact Hours/Week: 2 Hours

Course Title: System Analysis and Design Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course propels to for all intents and purposes see data frameworks arranging investigation, plan and usage graphical strategies for speaking to data structure, viable plan strategies database plan and prototyping; communication aptitudes, venture administration to unravel different genuine life issues.;

Course Content:

Introduction: Introduction to information systems, general design consideration of information systems.Overview: system concepts and the information systems environment, information needs, the concepts of MIS, the system development life cycle, the role of the systems analysis.Systems Analysis: Systems planning and the initial investigation, information gathering, the tools of structured analysis, feasibility study, cost benefit analysis.Systems Design: The process and stages of systems design, input/output and forms design, file organization and data base design.System Implementation: system testing and quality assurance, implementation and software maintenance, hardware/software selection, project scheduling and software, Security, disaster/recovery, and ethics in system development.Case study: Case studies of various information systems such as: Library management system, inventory system, voter identity management system, payroll system, etc.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Examine the system of an organization a`nd present a report on it.									A2			

Constraint satisfaction - Means Ends Analysis. Knowledge Representation: Approaches and issues in knowledge representation- Knowledge - Based Agent- Propositional Logic – Predicate logic – Unification – Resolution - Weak slot - filler structure – Strong slot - filler structure. Reasoning under uncertainty: Logics of non-monotonic reasoning - Implementation- Basic probability notation - Bayes rule – Certainty factors and rule-based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic. Planning and Learning: Planning with state space search - conditional planning-continuous planning - multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning AI programming languages: Introduction to PROLOG, knowledge representation, domain, predicate, clauses, database, back tracking, unification, list, and compound object using prolog. Introduction to selected topics in AI: Neural Networks, Expert system, Robotics and Fuzzy

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Discuss about the Artificial Intelligence (AI) problem space and related searching algorithms.	C1											
CLO2	Use the concept of knowledge representation with its application in AI implementation.		C3										
CLO3	Analyze the learning approaches to achieve the AI system.				C4								
CLO4	Design artificial neural network (ANN) suitable for pattern classification.									C6			

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Elaine Rich, Kevin Knight and Shivashankar B. Nair	Artificial Intelligence, <i>Tata McGraw-Hill</i>	Link is provided in Google Class Room
2.	Stuart J. Russel and Peter Norvig	Artificial Intelligence: A modern Approach, <i>Pearson Education Asia</i>	Link is provided in Google Class Room
3.	D. W. Patterson	Introduction to Artificial Intelligence and Expert System, <i>Prentice-Hall of India</i>	Link is provided in Google Class Room

4.	Patrick Henry Winston	Artificial intelligence, <i>Pearson Education Inc.</i>	Link is provided in Google Class Room
5.	N. P. Padhy	Artificial Intelligence and Intelligent System, <i>Oxford University Press</i>	Link is provided in Google Class Room

Course Code: CSE 3112

Contact Hours/Week: 2 Hours

Course Title: Artificial Intelligence Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

In this course, understudy will learn approximately the foremost viable AI methods, and pick up practice actualizing them and getting them to work for themselves. To provide hands-on experience in designing and implementing Artificial Intelligence systems through Prolog and Python Language. More vitally, understudies will learn almost not as it were the hypothetical underpinnings of learning, but moreover pick up the commonsense know-how required to rapidly and effectively apply these strategies to unused issues.

Course Content:

Introduction: History of AI - Intelligent agents – Structure of agents and its functions - Problem spaces and search - Heuristic Search techniques – Best-first search - Problem reduction - Constraint satisfaction - Means Ends Analysis. Knowledge Representation: Approaches and issues in knowledge representation- Knowledge - Based Agent- Propositional Logic – Predicate logic – Unification – Resolution - Weak slot - filler structure – Strong slot - filler structure. Reasoning under uncertainty: Logics of non-monotonic reasoning - Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory. Planning and Learning: Planning with state space search - conditional planning-continuous planning - Multi-Agent planning. Forms of learning - inductive learning - Reinforcement Learning - learning decision trees - Neural Net learning and Genetic learning AI programming languages: Introduction to PROLOG, knowledge representation, domain, predicate, clauses, database, back tracking, unification, list, and compound object using prolog. Introduction to selected topics in AI: Neural Networks, Expert system, Robotics and Fuzzy logic.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Proficient in Solving real-life problem using Prolog		P3										
CLO2	Combine different algorithms to develop a system with the help of AI that will have impact on the society.						C6						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive(create)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 3121

Contact Hours/Week: 3 Hours

Course Title: Database Management Systems

Credit Hour: 3

Prerequisite:CSE 2131

Course Rationale:

This course is designed to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve efficiently, and effectively information from a DBMS. It focusing on basics such as the relational algebra and data model, schema normalization, query optimization, and transactions. From this course, students also gather knowledge about the storage and file structure of DBMS and DBMS transaction processing systems and so on.

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information, Retrieval, Specialty Databases, Database Users and Administrators. Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema, Diagrams, Relational Query Languages, Relational Operations. Introduction to SQL: Overview of the SQL Query, Language, SQL Data Definition, Basic Structure of SQL, Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization. Advanced SQL: Accessing SQL From a Programming, Language, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation

Features, OLAP. Formal Relational Query Languages: The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus. Database Design and the E-R Model: Overview of the Design Process, Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling, Data, Other Aspects of Database Design. Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms, Database-Design Process, Modeling Temporal Data, Multivalued Dependencies, Domain-Key Normal Form. Application Design and Development: Application Programs and User Interfaces, Web Fundamentals, Servlets and JSP, Application Architectures, Rapid Application Development, Application Performance, Application Security, Encryption and Its Applications. Data Warehousing and Mining: Decision-Support Systems, Data Warehousing, Data Mining, Classification, Association Rules, Other Types of Associations, Clustering, Other Forms of Data Mining, Information Retrieval: Relevance Ranking Using Terms, Relevance Using Hyperlinks, Synonyms, Homonyms, and Ontologies, Indexing of Documents, Measuring Retrieval Effectiveness, Crawling and Indexing the Web, Information Retrieval: Beyond Ranking of Pages, Directories and Categories Object-Based Databases: Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R Features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Identify the basic terminologies of database management system (DBMS).	C1											
CLO2	Demonstrate the basics of SQL and construct queries using SQL to find required data from the database		C2										
CLO3	Construct feasible solution for secure and sustainable development in terms of societal and environmental aspect.							C3					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	A. Silberschatz	Database System Concepts, <i>McGraw-Hill</i> .	Link is provided in Google Class Room
2.	Raghu Ramakrishnan, Johannes Gehrke	Database Management System, McGraw-Hill Higher Education	Link is provided in Google Class Room
3.	James Martin	Principles of Database Management, Prentice-hall Of India Pvt Ltd	Link is provided in Google Class Room
4.	Ullman	Database Management systems, Prentice-Hall Publication.	Link is provided in Google Class Room

Course Code: CSE 3122

Contact Hours/Week: 2 Hours

Course Title: Database Management System

Credit Hour: 1

sessional

Prerequisite: None

Course Rationale:

This course focuses on the fundamentals relational database management systems, and the current developments in database theory and their practice. Also, to learn the design of a database starting from the conceptual design to the implementation of database schemas and user interfaces to a database

Course Content:

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information, Retrieval, Specialty Databases, Database Users and Administrators. Introduction to the Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema, Diagrams, Relational Query Languages, Relational Operations. Introduction to SQL: Overview of the SQL Query, Language, SQL Data Definition, Basic Structure of SQL, Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization. Advanced SQL: Accessing SQL From a Programming, Language, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation Features, OLAP. Formal Relational Query Languages: The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus. Database Design and the E-R Model: Overview of the Design Process, Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling, Data, Other Aspects of Database Design. Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms, Database-Design Process, Modeling Temporal Data, Multivalued Dependencies, Domain-Key Normal Form. Application Design and Development: Application Programs and User Interfaces, Web Fundamentals, Servlets and JSP, Application Architectures, Rapid Application Development, Application Performance, Application Security, Encryption and Its Applications. Data Warehousing and Mining: Decision-Support Systems, Data Warehousing, Data Mining, Classification, Association Rules, Other Types of Associations, Clustering, Other Forms of Data Mining, Information Retrieval: Relevance Ranking Using Terms, Relevance Using Hyperlinks, Synonyms, Homonyms, and Ontologies, Indexing of Documents, Measuring Retrieval Effectiveness, Crawling and Indexing the Web, Information Retrieval: Beyond Ranking of Pages, Directories and Categories Object-Based Databases: Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R Features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Explain the basic concepts of relational data model, entity-relationship model, relational algebra, structured query language SQL and relational database design				P3								
CLO2	Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.					P4							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 3131
 Course Title: Discrete Mathematics

Contact Hours/Week: 3 Hours
 Credit Hour: 3

Prerequisite: None

Course Rationale:

This course covers mainly the following major areas of discrete mathematics namely propositional and predicate calculus; sets, relations and functions; graph theory; algorithms and complexity; proof techniques and combinatorics.

Course Content:

Mathematical Logic: Connectives, Normal Forms, theory of inference for proposition calculus, predicate calculus, inference theory of predicate calculus, method of proof, mathematical induction. Counting: Basic principles, sequences, Fibonacci, Eullerian, Bernoulli numbers, permutation, and Pascal’s triangle. Relation and ordering: Relations, properties of Binary relation in a set, composition of binary relation, relation matrix and graph of a relation, partial ordering, path in relation and di-graph. Ordered relation and structure: Partially ordered set, external element of P.O. set, Lattice, finite. Boolean algebra, function on Boolean algebra, Boolean function as Boolean polynomial. Graph: Introduction to graph, graph terminology, representing graph and graph isomorphism, paths, reachability, connectivity, Euler and Hamilton path, shortest path problems, graph coloring, matrix representation of graph. Trees: Introduction of trees, application of trees, tree traversal, labeling trees, trees and sorting, spanning trees, minimal spanning tree, and undirected trees. Algebraic structure: Algebraic system, general properties, some simple algebraic system, ring, semi ring, module, semi-module, Homomorphism of semigroups and monoid, Grammars and languages, Formal definition of a language, Definition and examples, homomorphism, product and quotients of group.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Discuss logical thinking and its applications to computer science and engineering.	C2											
CLO2	Illustrate sets, graphs, trees, algebraic structures and homomorphism		C2										
CLO3	Apply different types of models to solve problems of collectivity and constant satisfaction						C3						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Kenneth H. Rosen	Discrete Mathematics and Its Applications, McGraw-Hill.	Link is provided in Google Class Room
2.	J. P. Tremblay and R. Manohar	Discrete Mathematics structures with applications to Computer Science, Mc-Graw Hill	Link is provided in Google Class Room
3.	Seymour Lipschutz	Theory and Problems of Discrete Mathematics, Schaum's Outline Series, McGraw-Hill	Link is provided in Google Class Room
4.	Bernard Kolman, Robert	Discrete Mathematical Structures, Prentice Hall	Link is provided in Google

	Busby, Sharon C. Ross		Class Room
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Course Code: CSE 3141

Contact Hours/Week: 3

Course Title: Computer Architecture and Organization

Hours

Credit Hour: 3

Prerequisite: None

Course Rationale:

This course discusses the basic structure of a computer including number representation, memory, processor, input, output and various instruction sets. The students will develop a good understanding of the basic building block behind the computer.

Course Content:

Concepts and Terminology: Digital computer components Hardware & Software and their dual nature, recent development, Role of Operating Systems (OS). Processor Design: Introduction: Processor organization, information representation, number formats; Fixed Point Arithmetic: Addition, subtraction, multiplication, division; ALU Design: Basic ALU organization, floating point arithmetic. Control Design: Hardwired control: Design methods, multiplier control unit, CPU control unit; Basic concept of Micro programmed Control, Control memory optimization. Memory Devices and its Organization: Different types of semiconductor memory, magnetic memory, optical memory, virtual memory, memory hierarchies; High-speed Memories: Interleaved memories, caches, associative memories. System Organization: Communications: Introduction, bus control; IO Systems: Programmed IO, DMA and interrupts, IO processors. Application HDL for microcomputer design: Description of Adder, ALU by using HDL, implementation of a simple microcomputer system using HDL.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the major functional components of a computer.	C2											

CLO2	Analyzethe basic instruction sets, operations and addressing modes.		C4											
CLO3	Understand memory hierarchy and its impact on computer performance.			C2										
CLO4	Develop an understanding of how a computer is structured internally.													A1

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

CLO4	Affective (Receive)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
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References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	John P. Hayes	Computer Architecture and Organization, <i>McGraw-Hill</i> .	Link is provided in Google Class Room
2.	Carl Hamacher, Zvonko Vranesic and Safwat Zaky	Computer Organization, <i>McGraw-Hill</i> .	Link is provided in Google Class Room
3.	Kai Hwang and Faye A. Briggs	Computer Architecture and Parallel Processing, <i>McGraw-Hill</i> .	Link is provided in Google Class Room
4.	William Stallings	Computer Organization and Architecture: Designing for Performance, <i>Prentice Hall</i> .	Link is provided in Google Class Room

Course Code: CSE 3142

Contact Hours/Week: 2 Hours

Course Title: Computer Architecture and Organization Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

The aim of this course is to give the students a practical knowledge on the structure of a computer and the architectural idea behind it.

Course Content:

Concepts and Terminology: Digital computer components Hardware & Software and their dual nature, recent development, Role of Operating Systems (OS). Processor Design: Introduction: Processor organization, information representation, number formats; Fixed Point Arithmetic: Addition, subtraction, multiplication, division. ALU Design: Basic ALU organization, floating point arithmetic. Control Design: Hardwired control: Design methods, multiplier control unit, CPU control unit; Basic concept of Micro programmed Control, Control memory optimization. Memory Devices and its Organization: Different types of semiconductor memory, magnetic memory, optical memory, virtual memory, memory hierarchies; High-speed Memories: Interleaved memories, caches, associative memories. System Organization: Communications: Introduction, bus control; IO Systems: Programmed IO, DMA and interrupts, IO processors. Application HDL for microcomputer design: Description of Adder, ALU by using HDL, implementation of a simple microcomputer system using HDL.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstrate the functional units of a computer.				P3								
CLO2	Examine the specification of a computer by using CPU-Z tool.					A2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Affective (Respond)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 3211

Contact Hours/Week: 3 Hours

Course Title: Digital Signal Processing

Credit Hour: 3

Prerequisite: MATH 1111, MATH 1211, MATH 2111, STAT 2211

Course Rationale:

The aim of this course is to introduce the students with the basic principles, techniques and applications of digital signal processing. It will also make the students aware of the meanings and implications of the properties of system and signal.

Course Content:

Introduction: signals, systems and signal processing, classification of signals, the concept of frequency in continuous time and discrete time signals, analog to digital and digital to analog conversion, Sampling and quantization. Discrete time signals and systems: Discrete time signals, discrete time systems, analysis of discrete time linear time invariant systems. Discrete time systems described by difference equations, implementation of discrete time systems, correlation and convolution of discrete time signals. The z-transform: Introduction, definition of the z-transform, z-transform and ROC of infinite duration sequence, properties of z-transform inversion of the z-transform, the one-sided z-transform. Frequency analysis of signals and systems: Frequency analysis of continuous time signals, Frequency analysis of discrete time signals, Properties of Fourier transform of discrete time signals, Frequency domain characteristics of linear time invariant system, linear time invariant systems as frequency selective filters, Inverse systems and deconvolution. The Discrete Fourier Transform: The DFT, Properties of the DFT, Filtering method based on the DFT, Frequency analysis of signals using the DFT. Fast Fourier Transform Algorithms: FFT algorithms, applications of FFT algorithm. Digital Filters: Design of FIR and IIR filters. Adaptive filters: Adaptive system, kalman filters, RLS adaptive filters, the steepest-descent method, the LMS filters. Application of DSP: Speech processing, analysis and coding, Matlab application to DSP.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Explain the operations on signals and acquire knowledge about systems.	C2											
CLO2	Analyze various signal processing techniques.		C4										
CLO3	Design IIR and FIR digital filters using various techniques.			C6									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	J. G. Prokis	Digital Signal Processing, <i>Prentice-hall Of India</i>	Link is provided in Google Class Room
2.	Defatta	Digital Signal Processing, <i>Wiley India Pvt Ltd</i>	Link is provided in Google Class Room
3.	R. G. Lyon	Understanding Digital Signal Processing, <i>Orling Kindersley India</i>	Link is provided in Google Class Room
4.	P. R. Babu.	Digital Signal Processing, <i>Scitech Publication..</i>	Link is provided in Google Class Room

Course Code: CSE 3212

Course Title: Digital Signal Processing Sessional

Prerequisite: None

Contact Hours/Week: 2 Hours

Credit Hour: 1

Course Rationale:

This course is important to develop mathematical and analytical skills necessary to analyze digital signals. It also makes the students familiar with the use of MATLAB software for signal processing.

Course Content:

Introduction: signals, systems and signal processing, classification of signals, the concept of frequency in continuous time and discrete time signals, analog to digital and digital to analog conversion, Sampling and quantization. Discrete time signals and systems: Discrete time signals, discrete time systems, analysis of discrete time linear time invariant systems. Discrete time systems described by difference equations, implementation of discrete time systems, correlation and convolution of discrete time signals. The z-transform: Introduction, definition of the z-transform, z-transform and ROC of infinite duration sequence, properties of z-transform inversion of the z-transform, the one-sided z-transform. Frequency analysis of signals and systems: Frequency analysis of continuous time signals, Frequency analysis of discrete time signals, Properties of Fourier transform of discrete time signals, Frequency domain characteristics of linear time invariant system, linear time invariant systems as frequency selective filters, Inverse systems and deconvolution. The Discrete Fourier Transform: The DFT, Properties of the DFT, Filtering method based on the DFT, Frequency analysis of signals using the DFT. Fast Fourier Transform Algorithms: FFT algorithms, applications of FFT algorithm. Digital Filters: Design of FIR and IIR filters. Adaptive filters: Adaptive system, kalman filters, RLS adaptive filters, the steepest-descent method, the LMS filters. Application of DSP: Speech processing, analysis and coding, Matlab application to DSP.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstrate the use of built-in and user defined functions of MATLAB for performing various operations on signal.					P3							
CLO2	Implement IIR and FIR filters to meet specific requirements.				P2								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulate)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 3221

Contact Hours/Week: 3

Course Title: Microprocessor and Assembly Language

Hours

Credit Hour:3

Prerequisite: CSE 2111, CSE 3141

Course Rationale:

This course introduces the students to the Microprocessor and its Assembly Language programming. The course is designed based on the popular Intel 8086 microprocessor and provides a good understanding of the microprocessor operation at the address, data, and control level.

Course Content:

Microprocessor Fundamentals: Architecture of a microprocessor, Data bus, address bus, control bus, I/O units and memory. Architecture: Architecture of Intel 8086 Microprocessor, its execution unit and bus-interface unit, its registers and flags. Programming Model: Programming model of 8086 processor, segment-offset address and physical address calculations, even and odd addressing, introduction of different addressing modes, Operating systems and BIOS, Memory organization of PC. Assembly Language: Introduction to IMB PC Assembly Language, Assembly Language syntax, Program Data, Variables, Named constants, program structure, memory models, Input/Output instruction, Running program, Program Segment Prefix. Status Register: The processor status and the Flag register, Overflow condition, Debugging a program. Flow control: Flow control instructions, Conditional jumps, signed versus unsigned jumps, High-level language structures, branching and looping structures. Logic Operation: Logic, Shift and Rotate Instruction, some common applications of Shift and Rotate operations. Data Structure: The Stack and Introduction to Procedures, Basic stack operations, Procedures Declaration, Communication between procedures, calling a procedure. Arithmetic Operation: Multiplication and Division Instructions, signed versus unsigned multiplications, divide

overflow, Signed Extension of Dividend. Arrays: Arrays and related addressing modes, DUP operator, register indirect modes, Based and Indexed addressing modes. String Manipulation: The string instructions director flag, moving a string, storing a string, loading a string, scanning a string, comparing strings, substring operation.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the programming model of Microprocessors and Microcontrollers	C2											
CLO2	Compare accepted standards and guidelines to select appropriate Microprocessor and Microcontroller to meet specified performance requirements.		C4										
CLO3	Discuss memory addressing modes.												C3

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Ytha Yu and CharlersMarut	Assembly Language Programming and Organization of the IBM PC, <i>McGraw-Hill</i>	Link is provided in Google Class Room
2.	Rafiquzzaman	Microprocessor and Microcomputer based System Design, <i>Crc Press Publication</i>	Link is provided in Google Class Room
3.	D. V. Hall	Microprocessors and Interfacing, <i>McGraw-Hill</i>	Link is provided in Google Class Room
4.	Y. Liu and G. A. Gibson	Microcomputer Systems: 8086/8088 Family, <i>Prentice-Hall</i>	Link is provided in Google Class Room
5.	Artwick	Microcomputer Interfacing, <i>Prentice-Hall series.</i>	Link is provided in Google Class Room
6.	Ramesh Goanker	Microcomputer Interfacing, <i>McGraw-Hill</i>	Link is provided in Google Class Room

Course Code: CSE 3222

Contact Hours/Week: 2 Hours

Course Title: Microprocessor and Assembly

Credit Hour: 1

Language Sessional

Prerequisite: None

Course Rationale:

This course introduces basics of assembly language, microprocessor architecture, and discusses different interfaces and the design of systems based on microprocessors.

Course Content:

Microprocessor Fundamentals: Architecture of a microprocessor, Data bus, address bus, control bus, I/O units and memory. Architecture: Architecture of Intel 8086 Microprocessor, its execution unit and bus-interface unit, its registers and flags. Programming Model: Programming model of 8086 processor, segment-offset address and physical address calculations, even and odd addressing, introduction of different addressing modes, Operating systems and BIOS, Memory organization of PC. Assembly Language: Introduction to IMB PC Assembly Language, Assembly Language syntax, Program Data, Variables, Named constants, program structure, memory models, Input/Output instruction, Running program, Program Segment Prefix. Status Register: The processor status and the Flag register, Overflow condition, Debugging a program. Flow control: Flow control instructions, Conditional jumps, signed versus unsigned jumps, High-level language structures, branching and looping structures. Logic Operation: Logic, Shift and Rotate Instruction, some common applications of Shift and Rotate operations. Data Structure: The Stack and Introduction to Procedures, Basic stack operations, Procedures Declaration, Communication between procedures, calling a procedure. Arithmetic Operation: Multiplication and Division Instructions, signed versus unsigned multiplications, divide overflow, Signed Extension of Dividend. Arrays: Arrays and related addressing modes, DUP operator, register indirect modes, Based and Indexed addressing modes. String Manipulation: The string instructions, director flag, moving a string, storing a string, loading a string, scanning a string, comparing strings, substring operation

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstrate basic input/output operations with 8086 microprocessors.				P3								
CLO2	Develop instructions that will perform the Bit manipulations, Multiple precision integer arithmetic.										P4		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 3231

Contact Hours/Week: 3 Hours

Course Title: Computer Networks

Credit Hour:3

Prerequisite:CSE 1211, CSE 2131

Course Rationale:

This course discusses the basic concepts related to computer networks including all the layers and their corresponding protocols. Students will also learn about IP addressing and various routing algorithms.

Course Content:

Introduction: Computer Networks and Applications, OSI reference model, TCP/IP model and

terminology, Connectionless and Connection Oriented services, Service primitives, The ARPANET Physical Layer: Circuit switching and Packet switching, X-25 protocol, Frame relay and Cell relay, ATM reference model. Medium Access Sublayer: Pure and slotted ALOHA, Persistent and Non persistent CSMA, CSMA with collision detection and collision free protocols, IEEE standard 802.3 and Ethernet. Data Link Layer: Types of errors, framing, error detection & correction methods; Flow control, Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC. Network Layer: Internet address, classful address, subnetting, static vs. dynamic routing, shortest path algorithm, flooding, distance vector routing, link state routing, ARP, RARP, IP, ICMP. Transport Layer: UDP, TCP, Connection management, Addressing, Establishing and Releasing Connection, Congestion control algorithm, Flow control and Buffering, Multiplexing. Presentation Layer: Data Compression techniques, Frequency Dependent Coding, Context Dependent Encoding. Application Layer: Internet and intranets, Internet services and goals, DNS, SMTP, FTP, Telnet, HTTP, World Wide Web (WWW), DHCP and BOOTP. Networking in Practice: Designing LAN, Cabling, Establishing Client-Server network, Configuring: Directory Server, Proxy server, FTP server, E-mail server, web server, DB server, Firewall, Network troubleshooting, network maintenance, network monitoring, Network programming.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Examine the basic layers computer network.		C4										
CLO2	Explain different protocols related to each layer.	C2											
CLO3	Demonstrate the term subnetting and its use in computer network.			C3									
CLO4	Analyze a networking model in group.											C4	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others <input type="checkbox"/> Others
CLO4	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Behrouz A. Forouzan	TCP/IP Protocol Suite, <i>McGraw-Hill</i>	Link is provided in Google Class Room
2.	Andrew S. Tanenbaum	Computer Networks, <i>Prentice Hall</i>	Link is provided in Google Class Room
3.	William Stallings	Data and Computer Communications, <i>Prentice Hall</i>	Link is provided in Google Class Room
4.	Behrouz A. Forouzan	Data Communications and Networking, <i>McGraw-Hill</i>	Link is provided in Google Class Room

Course Code: CSE 3232

Contact Hours/Week: 2 Hours

Course Title: Computer Networks Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

The aim of this course is to provide the students a theoretical and practical base about computer network. The students will be able to understand the importance of various layers and their working procedure. They will also gain a deeper knowledge about how different protocols work.

Course Content:

Introduction: Computer Networks and Applications, OSI reference model, TCP/IP model and terminology, Connectionless and Connection Oriented services, Service primitives, The ARPANET. Physical Layer: Circuit switching and Packet switching, X-25 protocol, Frame relay and Cell relay, ATM reference model. Medium Access Sublayer: Pure and slotted ALOHA, Persistent and Non persistent CSMA, CSMA with collision detection and collision free protocols, IEEE standard 802.3 and Ethernet. Data Link Layer: Types of errors, framing, error detection & correction methods; Flow control, Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC. Network Layer: Internet address, classful address, subnetting, static vs. dynamic routing, shortest path algorithm, flooding, distance vector routing, link state routing, ARP, RARP, IP, ICMP. Transport Layer: UDP, TCP, Connection management, Addressing, Establishing and Releasing Connection, Congestion control algorithm, Flow control and Buffering, Multiplexing. Presentation Layer: Data Compression techniques, Frequency Dependent Coding, Context Dependent Encoding. Application Layer: Internet and intranets, Internet services and goals, DNS, SMTP, FTP, Telnet, HTTP, World Wide Web (WWW), DHCP and BOOTP. Networking in Practice: Designing LAN, Cabling, Establishing Client-Server network. Configuring: Directory Server, Proxy server, FTP server, E-mail server, web server, DB server, Firewall, Network troubleshooting, network maintenance, network monitoring, Network programming.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstrate the functionalities of each layer in computer network.				P3								
CLO2	Design different network strategies and learn professional engineering practice to implement individual network.						C6						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment

Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive(create)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 3241**Contact Hours/Week: 3 Hours****Course Title: Operating System****Credit Hour:3****Prerequisite:**CSE 2231, CSE 3121**Course Rationale:**

To understand the fundamental principles, techniques and approaches which constitute a coherent body in operating system. To introduce with the most recent technology and development regarding operating system

Course Content:

Introduction: Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed,time-sharing, real-time, distributed, parallel.System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.Process Management: Processes: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocesscommunication.Threads: overview, benefits of threads, user and kernel threads.CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.Storage Management: Memory Management: Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.File Systems: file concept, access methods, directory structure,

file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance. I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance. Disk Management: Disk reliability, disk formatting, boot block, bad blocks. Protection & Security: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Clarify, recognize and dissect advanced working frameworks; concept for virtualization, cloud and different processor for operating system.	C2											
CLO2	Analyzing process, threads, memory and file management system		C4										
CLO3	Create and design algorithm for deadlock and memory management.			C5									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Evaluate)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Abraham Silberschatz and Peter Baer Galvin	Operating Systems Concepts, <i>Wiley Publisher.</i>	Link is provided in Google Class Room
2.	Tanenbaum	Operating Systems, <i>Prentice-Hall</i>	Link is provided in Google Class Room
3.	Madnick and J. Donovan	Operating systems, <i>McGraw-Hill</i>	Link is provided in Google Class Room
4.	B. Hausen	Operating System Principles, <i>Prentice-Hall of India</i>	Link is provided in Google Class Room
5.	Donovan	Systems Programming, <i>McGraw-Hill.</i>	Link is provided in Google Class Room
6.	Maurice. J. Bach	The design of the Unix operating system, <i>Prentice-Hall.</i>	Link is provided in Google Class Room
7.	M. MilenKovic	Operating System Concept and Design, <i>Tata McGraw Hill.</i>	Link is provided in Google Class Room

Course Code: CSE 3342

Course Title: Operating System Sessional

Prerequisite: None

Contact Hours/Week: 2 Hours

Credit Hour: 1

Course Rationale:

Recognize the fundamental mechanism of a computer operating system and the relations among the various components on the policies for process scheduling, deadlocks, memory management, synchronization, system calls and file systems.

Course Content:

Introduction: Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel. System Structure: Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls. Process Management: Processes: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocess communication. Threads: overview, benefits of threads, user and kernel threads. CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling. Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores. Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock. Storage Management: Memory Management: Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging. Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing. File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance. I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance. Disk Management: Disk reliability, disk formatting, boot block, bad blocks. Protection & Security: Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Developing inner principles architecture of Operating System				P2								
CLO2	Be able to calibrate with the command line interface					P3							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulate)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE4151

Contact Hours/Week: 3 Hours

Course Title: Parallel and Distributed Computing

Credit Hour: 3

Prerequisite: CSE 3231

Rationale:

This course deals with how the hardware and software work together and familiarize the students with the main parallel programming and pipelining techniques. And also deals with different types of distributed system architecture and programming. Upon completion of this course, students will be able to gather knowledge about the basic principles of parallel programming and distributed systems architecture.

Course Contents:

Introduction: Trends towards parallel processing, Parallel processing mechanism, Multiprogramming and Time sharing, Parallel Computer Structures, Parallelism and Pipelining, Parallel processing applications, Speedup Performance Laws, Parallel Random-Access Machines (PRAM) and VLSI model. Hardware Technology: Advanced processor Technology, Superscalar and Vector processor, Shared memory organization, Design of Linear and Non-linear Pipeline processor, Multiprocessor System Interconnects. Pipelining and Vector Processing: Principles of Pipelining, Classification of pipelined processors, Instruction and Arithmetic pipeline design, Vector Processing principles, Vector processing requirements, Designing Pipelined processors, Compound Vector processing, Recent Vector processors, Vectorization and Optimization methods. Parallel Programming: Parallel Programming models, Parallel Languages and Compilers, Code Optimization and Scheduling, Loop Parallelization and Pipelining, Parallel Programming Environments, Shared-variable program structures, mapping programs onto multi-computers. Distributed System: Introduction, Distributed System Architectures, Communication in Distributed Systems, Distributed Middleware, Client/Server Design Issues, Inter-process communication, RPC , Distributed Objects and Remote Invocation , Virtualization & Code Migration, Naming, Distributed Synchronization & Coordination, Consistency & Replication in Distributed Systems, Fault Tolerance, Distributed Transactions , Security, P2P Systems, Cloud Computing, Grid Computing. Distributed System Programming: Java RMI, CORBA, P2P, COM, DCOM, Multi Agent System, SOAP, Web Service.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the basic construction and necessity of parallel computing	C2											
CLO2	Explain the basic architecture of distributed system		C2										
CLO3	Analyze the algorithms for parallel computing with shared memory model and with distributed memory system			C4									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Kai Hwang	Advanced Computer Architecture Parallelism, Scalability, Programmability	Link is provided in Google Class Room
2.	George Coulouris, Jean Dollimore, and Tim Kindberg	Distributed Systems: Concepts and Design	Link is provided in Google Class Room
3.	R. J. Cypser	Communication Architecture for distributed system	Link is provided in Google Class Room

Course Code: CSE 4152

Contact Hours/Week: 2 Hours

Course Title: Parallel and Distributed Computing

Credit Hour: 1

Sessional

Prerequisite: None

Course Rationale:

This course is designed to analyze the basic difference between serial and parallel processing in computer system. After completing this course, students will be able to realize the parallel programming and design and develop faster computer program.

Course Content:

Introduction: Trends towards parallel processing, Parallel processing mechanism, Multiprogramming and Time sharing, Parallel Computer Structures, Parallelism and Pipelining, Parallel processing applications, Speedup Performance Laws, Parallel Random-Access Machines (PRAM) and VLSI model. Hardware Technology: Advanced processor Technology, Superscalar and Vector processor, Shared memory organization, Design of Linear and Non-linear Pipeline processor, Multiprocessor System Interconnects. Pipelining and Vector Processing: Principles of Pipelining, Classification of pipelined processors, Instruction and Arithmetic pipeline design, Vector Processing principles, Vector processing requirements, Designing Pipelined processors, Compound Vector processing, Recent Vector processors, Vectorization and Optimization methods. Parallel Programming: Parallel Programming models, Parallel Languages and Compilers, Code Optimization and Scheduling, Loop Parallelization and Pipelining, Parallel Programming Environments, Shared-variable program structures, mapping programs onto multi-computers. Distributed System: Introduction, Distributed System Architectures, Communication in Distributed Systems, Distributed Middleware, Client/Server Design Issues, Inter-process communication, RPC, Distributed Objects and Remote Invocation, Virtualization & Code Migration, Naming, Distributed Synchronization & Coordination, Consistency & Replication in Distributed Systems, Fault Tolerance, Distributed Transactions, Security, P2P Systems, Cloud Computing, Grid Computing. Distributed System Programming: Java RMI, CORBA, P2P, COM, DCOM, Multi Agent System, SOAP, Web Service.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Perform optimize sequential code for fastest possible execution				P2								
CLO2	Implement sequential programs and determine if they are worthwhile to parallelize					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4121

Contact Hours/Week: 3 Hours

Course Title: Software Engineering

Credit Hour:3

Prerequisite:None

Course Rationale:

The goal of this course is to give key level computer science and engineering students a fundamental understanding of software engineering principles and methods. It also requires understanding of how software engineering principles are applied to the creation of information systems and expansion

Course Content:

Introduction: Introduction to software engineering, Importance of software, The Software evolution, Software characteristics, Software components, Software applications, Crisis-Problem and causes. Software development life-cycle: Requirement analysis, software design, coding, testing and maintenance etc. Software requirement Specification: Water fall model, prototyping interactive enhancement, spiral model role of management in software development, role of matrices and measurement, Problem analysis, requirement specification, validation, matrices, monitoring and control. System Design: Problem partitioning, abstraction, top down and bottom up – design, structured approach, functional versus object-oriented approach, design specification and verification matrices, monitoring and control, Cohesiveness, coupling, 4 GL. Visio, DFD, Rational Rose, Visio, VS architectural design. Coding: TOP-DOWN and BOTTOM-UP structure programming, information hiding, programming style, and internal documentation, verification, metrics, monitoring and control, Subversion, Team System, Source Safe Testing: levels of testing, functional testing, structural testing, test plane, test class specification, reliability assessment, Software testing strategies, Verification and validation, Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing, System testing and debugging. Unit for unit testing, Selenium, WebLoad Software project Management: Cost estimation, project scheduling, staffing, software configuration management, structured Vs unstructured maintenance, quality assurance, project monitoring, risk management. Agile-XP, scrum, Rally, Version One, Bugzilla, Visual Studio Team System,

Agile project management, comparison with traditional process, Next generation software engineering Function oriented and object oriented Software design: Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to real time systems, Object oriented design, Graphical representation of OOD, Generic OO development paradigm. Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM, NANT, CruiseControl.Net for automated build.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Recall the knowledge about practices of software engineering.	C1											
CLO2	Be able to analyze the software design and development models.		C4										
CLO3	Verify various methods for requirement gathering and estimation.			A5									
CLO4	Demonstrate knowledge and understanding of SDLC and apply it in real time software development.											C3	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Affective (Characterization)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Roger S. Pressman	Software Engineering, A practitioner's Approach, <i>McGraw-Hill</i>	Link is provided in Google Class Room
2.	Ian Sommerville	Software Engineering, <i>Pearson Education.</i>	Link is provided in Google Class Room
3.	Richard Fairley	Software Engineering Concepts, <i>McGraw-Hill.</i>	Link is provided in Google Class Room
4.	Robert N. Charette	Software Engineering Environments, <i>McGraw-Hill.</i>	Link is provided in Google Class Room
5.	S. L. Pfleeger and J.M. Atlee	Software Engineering Theory and Practice, <i>Pearson Education.</i>	Link is provided in Google Class Room

Course Code: CSE 4122

Contact Hours/Week: 2 Hours

Course Title: Software Engineering Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

To apply specialized software engineering knowledge aptitudes for assist inquire about and plan of computer framework at proficient designing scale

Course Content:

Introduction: Introduction to software engineering, Importance of software, The Software evolution, Software characteristics, Software components, Software applications, Crisis-Problem and causes. Software development life-cycle: Requirement analysis, software design, coding, testing and maintenance etc. Software requirement Specification: Water fall model, prototyping interactive enhancement, spiral model role of management in software development, role of matrices and measurement, Problem analysis, requirement specification, validation, matrices, monitoring and control. System Design: Problem partitioning, abstraction, top down and bottom up – design, structured approach, functional versus object oriented approach, design specification and verification matrices, monitoring and control, Cohesiveness, coupling, 4 GL. Visio, DFD, Rational Rose, Visio, VS architectural design. Coding: TOP-DOWN and BOTTOM-UP structure programming, information hiding, programming style, and internal documentation, verification, metrics, monitoring and control, Subversion, Team System, Source Safe. Testing: levels of testing, functional testing, structural testing, test plane, test class specification, reliability assessment, Software testing strategies, Verification and validation, Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing, System testing and debugging. NUnit for unit testing, Selenium, WebLoad. Software project Management: Cost estimation, project scheduling, staffing, software configuration management, structured Vs unstructured maintenance, quality assurance, project monitoring, risk management. Agile-XP, scrum, Rally, Version One, Bugzilla, Visual Studio Team System, Agile project management, comparison with traditional process, Next generation software engineering. Function oriented and object oriented Software design: Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to real time systems, Object oriented design, Graphical representation of OOD, Generic OO development paradigm. Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM, NANT, CruiseControl.Net for automated build.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Develop systems' necessity design from top-level customer requirements.			P4									
CLO2	Examine prototypes of essential sub domain and present it.										A2		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Affective (Respond)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 2221

Contact Hours/Week: 3 Hours

Course Title: Management Information System

Credit Hour:3

Prerequisite:None

Course Rationale:

This course relates the basic concepts and technologies used in the field of management information systems also compare the processes of developing and implementing information systems. This course assists students to have best understanding the role of the ethical, social, and security issues of information systems & translate the role of information systems in organizations, the strategic management processes, with the implications for the management

Course Content:

Introduction to Management Information System (MIS). Role and Importance of Management. Process of Management. Organization Structure and Theory. Basis of Management Information System, Decision Making, Information, Systems, System Analysis and Design, Development of MIS. Application of Management Information System, Application in Manufacturing Sectors, Decision Support System, Enterprise Management System, Electronic Commerce (e-commerce), Fundamentals of e-commerce, Models of e-commerce, Retailing in e-commerce, Models of Business-to-Business e-commerce. Technology in Management Information System, Business Process Re-engineering.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the basic concepts and technologies used in the field of management information systems	C1											
CLO2	Comprehend the processes of developing and implementing information systems		C2										
CLO3	Systematize the role of ethical, social and security issues of information system.										A4		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Affective (Organization)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project

			<input type="checkbox"/> Others
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References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	E.M. Awad	System Analysis and Design, <i>Galgotia Publication Ltd</i>	Link is provided in Google Class Room
2.	P. Edwards	System Analysis & Design, <i>McGraw-Hill</i>	Link is provided in Google Class Room
3.	J.G. Burch Jr., F.R. Strater and G. Grundnitski	Information Systems: Theory and Practice, <i>John Wiley & Sons.</i>	Link is provided in Google Class Room
4.	G. Scott.	Principles of Management Information Systems, <i>McGraw-Hill</i>	Link is provided in Google Class Room

Course Code: CSE 4221

Contact Hours/Week: 3 Hours

Course Title: Neural Networks and Fuzzy Systems

Credit Hour:3

Prerequisite: CSE 3111

Course Rationale:

The aim of this course is to introduce the students with the basic principles of neural networks, associate memory, feed forward model and fuzzy logic. The students will learn how to solve practical problems such as robotic control, recognition etc

Course Content:

Introduction: Humans and computers, the structure of the brain, learning in machines. Pattern Recognition: Pattern recognition in perspective, feature vector and feature space, discriminant functions, classification techniques, linear classifiers, statistical techniques. The Basic neuron: Modeling the single neuron, learning in simple neurons, the perceptron and its proof and limitations. The Multilayer Perceptron: Altering the perceptron model to a new model, the multilayer perceptron algorithm, multilayer perceptron's as classifiers, fault tolerance, learning difficulties, radial basis function. Kohonen Self-Organizing Networks: The Kohonen algorithm, weight training, neighborhoods, reducing the neighborhood, learning vector quantization. Hopfield Networks: The Hopfield model, the energy landscape, the Boltzmann machine. Adaptive Resonance Memory: Adaptive resonance theory- ART, ART algorithm, training the ART network, classification. Associative Memory: Implementing associative memory, the ADAM system, bidirectional associative memories. Fuzzy System: Introduction to fuzzy systems, fuzzy relations, fuzzy numbers, fuzzy control. Defuzzification: Defuzzification methods, applications, concept of neuro-fuzzy and neuro-GA network.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PL01	PL02	PL03	PL04	PL05	PL06	PL07	PL08	PL09	PL010	PL011	PL012
CLO1	Describe the fundamentals of Fuzzy logic and neural network.	C2											
CLO2	Illustrate the ability of neural network and fuzzy system to learn and adapt.		C4										
CLO3	Apply fuzzy logic principles for fuzzy control.			C3									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Shigeo Abe	Neural Networks and Fuzzy Systems	Link is provided in Google Class Room
2.	Jacek M. Zurada	Introduction to Artificial Neural Systems	Link is provided in Google Class Room
3.	PatrickK.Simpson	Artificial neural systems: foundations, paradigms, applications, and implementations.	Link is provided in Google Class Room

Course Code: CSE 4222

Contact Hours/Week: 2 Hours

Course Title: Neural Networks and Fuzzy Systems

Credit Hour: 1

Sessional

Prerequisite: None

Course Rationale:

This course is beneficial for acquiring real-world knowledge and abilities for handling applications based on neural networks and fuzzy systems.

Course Content:

Introduction: Humans and computers, the structure of the brain, learning in machines. Pattern Recognition: Pattern recognition in perspective, feature vector and feature space, discriminant functions, classification techniques, linear classifiers, statistical techniques. The Basic neuron: Modeling the single neuron, learning in simple neurons, the perceptron and its proof and limitations. The Multilayer Perceptron: Altering the perceptron model to a new model, the multilayer perceptron algorithm, multilayer perceptrons as classifiers, fault tolerance, learning difficulties, radial basis function. Kohonen Self-Organizing Networks: The Kohonen algorithm, weight training, neighborhoods, reducing the neighborhood, learning vector quantization. Hopfield Networks: The Hopfield model, the energy landscape, the Boltzmann machine. Adaptive Resonance Memory: Adaptive resonance theory- ART, ART algorithm, training the ART network, classification. Associative Memory: Implementing associative memory, the ADAM system, bidirectional associative memories. Fuzzy System: Introduction to fuzzy systems, fuzzy relations, fuzzy numbers, fuzzy control. Defuzzification: Defuzzification methods, applications, concept of neuro-fuzzy and neuro-GA network.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Implement various neural network					P2							

	algorithms in python/MATLAB.												
CLO2	Develop models utilizing fuzzy systems for various real-life applications.				P4								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4131

Contact Hours/Week: 3 Hours

Course Title: Wireless Communication and Networks.

Credit Hour:3

Prerequisite: None

Course Rationale:

The aim of this course is to make familiar with modern wireless technology. In this course students will learn topics like evolution of wireless technology, cellular system mobile systems, multiple access technique, frequency re-use etc.

Course Content:

Introduction To Wireless Communication Systems: Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems. Modern Wireless Communication Systems: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Bluetooth and Personal Area networks. Introduction to Cellular Mobile Systems: Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. Cellular System Design

Fundamentals: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity. Multiple Access Techniques for Wireless Communication: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems. Wireless Networking: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks. Wireless LAN Technology - IEEE 802.11 Wireless LAN Standard - Bluetooth. Intelligent Cell Concept and Application: Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe basic concept on wireless communication.	C1											
CLO2	Discuss in-depth knowledge on modern mobile communication system		C2										
CLO3	Evaluate different wireless technologies in group											C5	

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Evaluate)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	William Stallings	Donald Hearn and M. Pauline Baker	Link is provided in Google Class Room
2.	Theodore S.	Steven Harrington	Link is provided in Google Class Room
3.	Rappaport	F. S. Hill	Link is provided in Google Class Room
4.	John G. Proakis	Plastock and Kalley	Link is provided in Google Class Room
5.	W.C.Y.Lee;	Zhigang Xiang & Roy Plastock	Link is provided in Google Class Room

Course Code: CSE 4132

Contact Hours/Week: 2

Course Title: Wireless Communication and Networks
Sessional

Hours
Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is designed to teach about practical experiments on the concepts of wireless networking, modern wireless communication systems and will give concrete concept on constructing different network.

Course Content:

Introduction To Wireless Communication Systems: Evolution of mobile radio communications, examples of wireless comm. systems, paging systems, Cordless telephone systems, comparison of various wireless systems. Modern Wireless Communication Systems: Second generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Bluetooth and Personal Area networks. Introduction to Cellular Mobile Systems: Spectrum Allocation, basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. Cellular System Design Fundamentals: Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity. Multiple Access Techniques for Wireless Communication: Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access, packet ratio, capacity of a cellular systems. Wireless Networking: Difference between wireless and fixed telephone networks, development of wireless networks, fixed network transmission hierarchy, traffic routing in wireless networks, wireless data services, common channel signaling, ISDN (Integrated Services digital Networks), advanced intelligent networks. Wireless LAN Technology - IEEE 802.11 Wireless LAN Standard - Bluetooth. Intelligent Cell Concept and Application: Intelligent cell concept, applications of intelligent micro-cell Systems, in-Building Communication, CDMA cellular Radio Networks.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstrate basic concept on Different Wireless Network.				P3								
CLO2	Relate various wireless network strategies and learn professional practice to implement individual network.						C6						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive (Create)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE4141

Contact Hours/Week: 3 Hours

Course Title: Digital Image Processing

Credit Hour:3

Prerequisite: None

Course Rationale:

Introduce the fundamentals of image processing and manipulation of television, medical imaging modalities such as X-ray or ultrasound, photography, security, astronomy and remote sensing. The motivation of the course is to develop basics knowledge on Digital Image Processing. After completing the course, the students will be able to start working on computer vision.

Course Content:

Introduction and Fundamental to Digital Image Processing: What is Digital Image Processing, Origin of Digital Image Processing, Examples that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Digital Image Processing System, Image sensing and acquisition, Image sampling, quantization and representation, Basic relationship between pixels. Image Enhancement in the Spatial Domain & Frequency domain: Background, Basic gray level transformation, Histogram processing, Basics of spatial filtering, Smoothing and Sharpening Spatial filters, Introduction to Fourier Transform and the Frequency Domain, Discrete Fourier Transform. Smoothing and Sharpening Frequency-Domain filters. Image Restoration: Image Degradation/Restoration Process, Noise models, Restoration in presence of noise, Inverse Filtering, Minimum Mean Square Filtering, Geometric mean filter, Geometric transformations. Color Image Processing: Color Fundamentals, Color models, Basis of full color image processing, Color transformations. Image Compression: Fundamentals, Image compression models, Error free compression, Lossy compression. Morphological image processing: Preliminaries, Dilations and Erosion, opening and closing, some basic morphological algorithms. Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation. Representation, Description and Recognition: Representation-chain codes, polygonal approximation and skeletons, Boundary descriptors-simple descriptors, shape numbers, regional descriptors- simple, topological descriptors, Pattern and Pattern Classes-Recognition based on matching techniques.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the concept of digital image representation and enhancement.	C1											
CLO2	Generate simulation for problems related to business, operation research, operating system, computer design and environment and demonstrate the knowledge for sustainable and feasible solution.							C6					
CLO3	Purse image processing algorithms in relevant applications.												A3

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

CLO3	Affective (Value)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
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References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Rafeal C. Gonzalez & Richard E. Woods	Digital Image Processing, <i>Prentice-Hall Publication</i>	Link is provided in Google Class Room
2.	A. K. Jain	Fundamentals of Digital Image Processing, <i>Academic Press</i> .	Link is provided in Google Class Room
3.	Mark S. Nixon & Albert S. Aguado	Feature Extraction and Image Processing, <i>Academic Press</i>	Link is provided in Google Class Room
4.	William K. Pratt	Digital Image Processing, <i>Wiley-Interscience</i> ,	Link is provided in Google Class Room

Course Code: CSE 4142

Contact Hours/Week: 2 Hours

Course Title: Digital Image Processing Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is outlined to supply essential concepts of digital picture preparing with accentuation in picture preparing procedures, image sifting plan and applications.

Course Content:

Introduction and Fundamental to Digital Image Processing: What is Digital Image Processing, Origin of Digital Image Processing, Examples that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Digital Image Processing System, Image sensing and acquisition, Image sampling, quantization and representation, Basic relationship between pixels. Image Enhancement in the Spatial Domain & Frequency domain: Background, Basic gray level transformation, Histogram processing, Basics of spatial filtering, Smoothing and Sharpening Spatial filters, Introduction to Fourier Transform and the Frequency Domain, Discrete Fourier Transform. Smoothing and Sharpening Frequency-Domain filters. Image Restoration: Image Degradation/Restoration Process, Noise models, Restoration in presence of noise, Inverse Filtering, Minimum Mean Square Filtering, Geometric mean filter, Geometric transformations. Color Image Processing: Color Fundamentals, Color models, Basis of full color image processing, Color transformations. Image Compression: Fundamentals, Image compression models, Error free compression, Lossy compression. Morphological image processing: Preliminaries, Dilations and Erosion, opening and closing, some basic morphological algorithms. Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation. Representation, Description and Recognition: Representation-chain codes, polygonal approximation and skeletons, Boundary descriptors-simple descriptors, shape numbers, Regional descriptors- simple, topological descriptors, Pattern and Pattern classes-Recognition based on matching techniques

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Implement the basic operations for image conversion				P2								
CLO2	Follow the programs in MATLAB for performing specified operations in the above areas of image processing.					P1							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Naturalization)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4111
Course Title: Compiler Design
Prerequisite: None

Contact Hours/Week: 3 Hours
Credit Hour:3

Course Rationale:

To understand the basic principles of compiler design, its various constituent parts, data structures and algorithms required to be used in the compiler. And also gives a good feeling for how a large problem can be broken down into several parts and solved in a manner that is not ad-hoc.

Course Content:

Introduction: Introduction to compiler, compiler and translator, the structure of a compiler. Grammars: Notation and concepts for languages and Grammars, sets and string, Discussion and classification of Grammars, Scanner regular expression, regular definition, finite automata, LL and LR Grammars, ambiguous grammar. Parsing: Basic parsing technique, parsers, shift reduce parsing, operator-procedure parsing, top-down parsing, bottom-up parsing, predictive parsing. Syntax: Syntax directed translation, intermediate code generation, polish notation, parse tree and syntax trees, quadruples, triples, Boolean expression. Symbol Table: Perspective and motivation of symbol table. Symbol table content, operation on symbol table, organization of symbol table. Code Optimization: Code optimization, sources of optimization, basic blocks, folding, loop optimization, flow-graph, induction variable elimination, reduction in strength, code motion. Error Handling: Compile time error handling, error detection, error recovery, error repair. Coding: Code generation, object programs, problems in code generation, a machine model, a simple code generator, register allocation and assignment peephole optimization.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Define the character and goal of compilers in programming languages	C1											
CLO2	Identify similarities and differences among different steps of compiler design.		C2										
CLO3	Examine the role of runtime environments, memory organization and translation for developing intermediate code in the compilation process and also discuss the importance of symbol table and error handler.			C4									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Alfred V. Aho and Jeffrey D. Ullman	Principles of Compiler Design	Link is provided in Google Class Room
2.	Trembly and Sorensen	Theory and Practices of Compiler Writing	Link is provided in Google Class Room
3.	Hopcroft and Ulman	Introduction to Automata Theory, Languages and Computation	Link is provided in Google Class Room

Course Code: CSE4112

Contact Hours/Week: 2 Hours

Course Title: Compiler Design Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is important to learn the conversion process of high-level programming languages into low level programming languages. It enables the students to gain knowledge about various

stages of compiler and provide practical programming necessary for constructing a compiler.

Course Contents:

Introduction: Introduction to compiler, compiler and translator, the structure of a compiler. Grammars: Notation and concepts for languages and Grammars, sets and string, Discussion and classification of Grammars, Scanner regular expression, regular definition, finite automata, LL and LR Grammars, ambiguous grammar. Parsing: Basic parsing technique, parsers, shift reduce parsing, operator-procedure parsing, top-down parsing, bottom-up parsing, predictive parsing. Syntax: Syntax directed translation, intermediate code generation, polish notation, parse tree and syntax trees, quadruples, triples, Boolean expression. Symbol Table: Perspective and motivation of symbol table. Symbol table content, operation on symbol table, organization of symbol table. Code Optimization: Code optimization, sources of optimization, basic blocks, folding, loop optimization, flow-graph, induction variable elimination, reduction in strength, code motion. Error Handling: Compile time error handling, error detection, error recovery, error repair. Coding: Code generation, object programs, problems in code generation, a machine model, a simple code generator, register allocation and assignment peephole optimization.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Replicate of how programming language Syntax, Semantics are used in translate into executable equivalents				P1								
CLO2	Implement various phases of compiler using modern software tools					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Imitation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Lab Viva <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Lab Viva <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Strategy:

Course Code: CSE 4161

Contact Hours/Week: 3 Hours

Course Title: Internet & Web Technology

Credit Hour:3

Prerequisite: None

Course Rationale:

This course is aimed to provide a basic web concept. It will teach the students how to design a website and the coding behind it. It will also develop some ideas about various protocols and security issues related to a website.

Course Content:

Internet principles: Overview of internet technology, Internet services, Email, basic web concept, Client server model, retrieving data from internet. Internet Security: Encryption & Decryption algorithm, Authentication Some Distributed Application: Simple network management protocol, Telnet, SMTP protocols, WWW- Client and Servers, MIME, locating information on the web, video on demand. Internetworking: Network inter-connection, bridges and gateway, connection less and connection oriented internetworking, routing and fragmentation, TCP/IP protocols, Domain name system, multicasting Web Programming: The history of the internet and www, Introduction to the WWW, Web Browsers, Web Navigation, Web Searching and Researching, writing HTML code, Web servers and posting web pages, Page design, site design , Using tables, frames and forms, Images , Background, Adding multimedia- Audio, Video, Graphics.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PL01	PL02	PL03	PL04	PL05	PL06	PL07	PL08	PL09	PL010	PL011	PL012
CLO1	Explain basic web concepts.	C2											
CLO2	Analyzenetwork security related issues such as authentication, encryption, decryption.		C4										
CLO3	Demonstrate how to design a website.			C3									
CLO4	Design of website in terms of ethical and legal context which includes account safety and privacy.								C6				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Behrouz A. Forouzan	TCP/IP Protocol Suite, <i>McGraw-Hill</i>	Link is provided in Google Class Room
2.	Andrew S. Tanenbaum	Computer Networks, <i>Prentice Hall</i>	Link is provided in Google Class Room
3.	William Stallings	Data and Computer Communications, <i>Prentice Hall</i>	Link is provided in Google Class Room

Course Code: CSE 4162

Contact Hours/Week: 2 Hours

Course Title: Internet and Web Technology Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is aimed to provide a practical knowledge on how to build a website. It will develop the basic skills of designing and developing a website. A student will learn all the necessary coding behind designing a successful web page.

Course Content:

Internet principles: Overview of internet technology, Internet services, Email, basic web concept, Client server model, retrieving data from internet Internet Security: Encryption & Decryption algorithm, Authentication Some Distributed Application: Simple network management protocol, Telnet, SMTP protocols, WWW- Client and Servers, MIME, locating information on the web, video on demand. Internetworking: Network inter-connection, bridges and gateway, connection less and connection oriented internetworking, routing and fragmentation, TCP/IP protocols, Domain name system, multicasting Web Programming: The history of the internet and www, Introduction to the WWW, Web Browsers, Web Navigation, Web Searching and Researching, writing HTML code, Web servers and posting web pages, Page design, site design, Using tables, frames and forms, Images, Background, Adding multimedia- Audio, Video, Graphics.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Discuss elements and attributes of a web page.									A2			
CLO2	Design of website that will be able provide different functionalities for public development.						C6						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy

Strategy:

CLO1	Affective (Respond)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive (Create)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE4171

Course Title: Computational Geometry

Prerequisite: CSE 2211, MATH 1211

Course Rationale:

Computational geometry is a mathematical area that involves the design, evaluation and implementation of algorithms for fixing geometric input and output problems that deals with what can be computed and how one can efficiently compute in the domain of geometry. It is also used in pattern recognition and solid modelling in manipulation of curves and surface.

Course Content:

Introduction: historical perspective, geometric preliminaries. Convex hulls algorithms in 2d and 3d, lower bounds. Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs; Voronoi diagrams: construction and applications, variants; Delaney triangulations: divide and conquer, flip and incremental algorithms, duality of Voronoi diagrams, min-max angle properties; Geometric searching: point location, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees; Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems; Arrangements of lines: arrangements of hyperplanes, zone theorems, many-faces complexity and algorithms; Combinatorial geometry: Ham-sandwich cuts, Helly's theorems, k-sets, polytopes and hierarchies, polytopes and linear programming in d-dimensions, complexity of the union of convex sets, simply connected sets and visible regions; Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements; Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing; Applications of computational

Contact Hours/Week: 3 Hours

Credit Hour: 3

geometry.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe basic concept on computational geometry.	C1											
CLO2	Discuss in-depth knowledge on different algorithms of geometric properties.		C2										
CLO3	solve geometric algorithms in an efficient manner.			C6									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project

			<input type="checkbox"/> Others
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Reference:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	M. d. Berg, O.Schwarzkopf, M. v. Kreveld and M. Overmars	Computational Geometry: Algorithms and Applications, Springer.	Link is provided in Google Class Room
2.	F. P. Preparata and M.I..Shamos	Computational Geometry: An Introduction, Springer.	Link is provided in Google Class Room
3.	J. O. Rourke	Computational Geometry in C, Cambridge University Press.	Link is provided in Google Class Room

Course Code: CSE 4172

Contact Hours/Week: 2 Hours

Course Title: Computational Geometry Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course involves the design, evaluation and implementation of algorithms for fixing geometric input and output problems in the domain of geometry. Here students will also get an idea on pattern recognition and solid modelling in manipulation of curves and surface.

Course Content:

Introduction: historical perspective, geometric preliminaries. Convex hulls algorithms in 2d and 3d, lower bounds. Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs; Voronoi diagrams: construction and applications, variants; Delaney triangulations: divide and conquer, flip and incremental algorithms, duality of Voronoi diagrams, min-max angle properties; Geometric searching: point location, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees; Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems; Arrangements of lines: arrangements of hyperplanes, zone theorems, many-faces complexity and algorithms; Combinatorial geometry: Ham-sandwich cuts, Helly's theorems, k-sets, polytopes and hierarchies, polytopes and linear programming in d-dimensions, complexity of the union of convex sets, simply connected sets and visible regions; Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements; Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing; Applications of computational geometry.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Follow basic concept on computational geometry.				P1								
CLO2	Implement different geometric algorithms efficiently.					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Imitation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4181
Course Title: Computer Graphics
Prerequisite: None

Contact Hours/Week: 3 Hours
Credit Hour:3

Course Rationale:

Computer graphics is a core technology in modern 2D and 3D visualization, computation and compilation. By studying this course students will be able to construct, modify and visualize various types of graphical structures and images with the help of programming and algorithms, which will help them to understand the field of imaging technology.

Course Content:

Internet principles: Overview of internet technology, Internet services, Email, basic web Introduction to Computer Graphics and Graphics systems: Overview of computer graphics, representing pictures, preparing, presenting and interacting with pictures for presentations; Visualization and image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active and Passive graphics devices; Computer graphics software. Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm. 2D transformation and viewing: Basic transformations: translation, rotation, scaling; Matrix representations and homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. 3D transformation and viewing: 3D transformations: translation, rotation, scaling and other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing. Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic Bspline curves, rational B-spline curves. Hidden surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry. Color and shading models: Light & color model; interpolative shading model; Texture.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe basic concept on computer graphics	C1											
CLO2	Construct 2D and 3D transformation and visualization			C3									
CLO3	Analyze computer graphics algorithms with underlying program		C4										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Mid-term <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Donald Hearn and M.Pauline Baker	Computer Graphics, Prentice Hall	Link is provided in Google Class Room
2.	Steven Harrington	Computer Graphics: A Programming Approach, McGraw- Hill College.	Link is provided in Google Class Room
3.	F. S. Hill	Fundamentals of Computer Graphics, Prentice Hall	Link is provided in Google Class Room
4.	Plastock and Kalley	Computer Graphics, Mcgraw-hill.	Link is provided in Google Class Room

Course Code: CSE 4182

Course Title: Computer Graphics Sessional

Contact Hours/Week: 2

Hours

Credit Hour: 1

Prerequisite: None

Course Rationale:

In this course students will learn how to construct, modify and visualize various types of

graphical structures and images with the help of programming and algorithms.

Course Content:

Introduction to Computer Graphics and Graphics systems: Overview of computer graphics, representing pictures, preparing, presenting and interacting with pictures for presentations; Visualization and image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active and Passive graphics devices; Computer graphics software. Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham’s line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm. 2D transformation and viewing: Basic transformations: translation, rotation, scaling; Matrix representations and homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. 3D transformation and viewing: 3D transformations: translation, rotation, scaling and other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing. Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic Bspline curves, rational B-spline curves. Hidden surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer’s algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry. Color and shading models: Light & color model; interpolative shading model; Texture

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Follow basic concept on computer graphics				P1								
CLO2	Implement 2D and 3D object translation, visualization and transformations with different algorithm of computer graphics					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Imitation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4281

Contact Hours/Week: 3 Hours

Course Title: Design of VLSI Circuits and Systems

Credit Hour:3

Prerequisite: CSE 2221

Course Rationale:

The purpose of this course is to know the fundamental knowledge about microelectronics and MOS technology, scaling of MOS circuit with different practical applications. After studying this course, students will be able to analyze various design on ALU system, CMOS technology, VHDL concept, etc.

Course Content:

Introduction to Microelectronics and MOS Technology, Basic Electrical Properties and Circuit Design Processes of MOS and Bi CMOS Circuits, Inverter Circuits, Sub-System Design Processes and Layout, Scaling of MOS Circuits: Scaling Models and Scaling Factors, Limitation of Scaling. Computational Elements: Design of an ALU Sub-System, Adder, Multipliers, Memory Registers, Dynamic & Static Flip-Flops, Bus Arbitration and Aspects of System Timing. CMOS Fabrication, Practical Aspects of Design Tools and Test-Ability CMOS Design, Behavioral Description, Structural Description, Physical Description and Design Verification. Introduction to Ga-As Technology: Ultra-Fast Circuits and Systems. VHDL background and basic concepts, structural specifications of hardware design organization and parameterization.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	CLO Statement	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe microelectronics and MOS technology with basic electrical properties and circuit design procedure.	C1											
CLO2	Develop basic design of ALU system, flip-flops and application.			C6									
CLO3	Analyze CMOS design, CMOS fabrication, and VHDL that consisting of d concept with different application.		C4										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	K. Eshraghian & D. A. Pucknell	Basic VLSI design: System & Circuit, <i>Prentice-Hall</i>	Link is provided in Google Class Room
2.	R. K. Brayton	Logic Minimization Algorithms for VLSI Synthesis, <i>Kluwer Academic Publishers Norwell, MA, USA.</i>	Link is provided in Google Class Room
3.	F. Lombardi and M. G. Sami	Testing and Diagnosable Design of VLSI and ULSI, <i>Springer.</i>	Link is provided in Google Class Room
4.	C. A. Mead and L. A. Conway	Introduction to VLSI Systems, <i>Addison-Wesley.</i>	Link is provided in Google Class Room

Course Code: CSE 4282

Contact Hours/Week: 2 Hours

Course Title: Design of VLSI Circuits and Systems

Credit Hour: 1

Sessional

Prerequisite: None

Course Rationale:

This course is designed to teach about fundamental concepts of MOS technology, various CMOS design, through software experimental work in the laboratory.

Course Content:

Introduction to Microelectronics and MOS Technology, Basic Electrical Properties and Circuit Design Processes of MOS and Bi CMOS Circuits, Inverter Circuits, Sub-System Design Processes and Layout, Scaling of MOS Circuits: Scaling Models and Scaling Factors, Limitation of Scaling. Computational Elements: Design of an ALU Sub-System, Adder, Multipliers, Memory Registers, Dynamic & Static Flip-Flops, Bus Arbitration and Aspects of System Timing. CMOS Fabrication, Practical Aspects of Design Tools and Test-Ability CMOS Design, Behavioral Description, Structural Description, Physical Description and Design Verification. Introduction to Ga-As Technology: Ultra-Fast Circuits and Systems. VHDL background and basic concepts, structural specifications of hardware design organization and parameterization.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	CLO Statement	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Familiarize with different types of CMOS design through laboratory software experimental work.	C1											
CLO2	Build different CMOS circuit in software simulation.				P2								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4211

Contact Hours/Week: 3 Hours

Course Title: Computer Peripherals and Interfacing

Credit Hour:3

Prerequisite:CSE 3231

Course Rationale:

To understand the basic ideas and techniques for interfacing a microcontroller or microprocessor to the external devices. It is desired that students attracted to data acquisition and real time control system and also design a simple control system like LED display control.

Course Content:

Basic concepts of microprocessor interfacing: reviews of address decoding concepts, Input and Output port design, decoder, encoder, mutliplexer, demultiplexer. Interfacing peripherals: Peripheral I/O and memory mapped I/O, Interfacing with external memory, microprocessor-controlled data transfer and peripheral controlled data transfer, Peripheral I/O instruction for Intel 8085 Microprocessor and its timing diagram. Interfacing with LED, seven segment display, Push-button keys, Matrix keyboard, AD and DA converter. Programmable Interface device: 8212, Programmable devices with Handshake signals, 6155/8156 multipurpose programmable devices, Interfacing seven segment LED using 8155, 8155 timer, 8155 I/O ports in Handshake modes and its interfacing example, Interfacing 8355/8755 Programmable I/O ports, 8279 programmable keyboard/display interface and its interfacing example, 8255 Programmable peripheral interface, Block diagram of 8255, its different mode of operation, Interfacing A/D converter using 8255, Application of 8255 in Handshake mode, 8253 Programmable interval timer, programming 8263, 8253 as counter, 8259 programmable interrupt controller and its priority mode and other features, programming the 8259, 8257 DMA controller and its block diagram, example of application of 8257 DMA controller. Serial I/O and

data communication: Synchronous and asynchronous transmission, Parity check, BAUD, RS 232 standard, Software versus programmable hardware approach, software controlled asynchronous serial I/O, 8085 serial I/O SOD and SID, Hardware controlled serial I/O using programmable chips, 8251 programmable communication interface and its block diagram, interfacing RS 232 Terminal using the 8251A.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe different types of external components (sensors, PPIs, external memories) with computer systems	C1											
CLO2	Explain how to interface different types of external components and constructing the simple control system		C2										
CLO3	Apply the knowledge and develop the simple control system of different hardware components			C3									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Midterm Exam <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Midterm Exam <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Midterm Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Text Book/Reference Book(s)	Author(s)	Online Availability
1.	Microprocessor and Microcomputer based System Design	Rafiquzzaman	Link is provided in Google Class Room
2.	Microprocessors and Interfacing	D. V. Hall	Link is provided in Google Class Room
3.	Microcomputer Interfacing	Artwick	Link is provided in Google Class Room

Course Code: CSE 4212

Contact Hours/Week: 2 Hours

Course Title: Computer Peripherals and Interfacing

Credit Hour: 1

Sessional

Prerequisite: None

Course Rationale:

To understand the basic ideas and techniques for interfacing a microcontroller or microprocessor to the external devices. It enables the students to implement various attractive real-life projects.

Course Content:

Basic concepts of microprocessor interfacing: reviews of address decoding concepts, Input and Output port design, decoder, encoder, mutliplexer, demultiplexer. Interfacing peripherals: Peripheral I/O and memory mapped I/O, interfacing with external memory, microprocessor-controlled data transfer and peripheral controlled data transfer, Peripheral I/O instruction for Intel 8085 Microprocessor and its timing diagram. Interfacing with LED, seven segment display, Push-button keys, Matrix keyboard, AD and DA converter. Programmable Interface device: 8212, Programmable devices with Handshake signals, 6155/8156 multipurpose programmable devices, Interfacing seven segment LED using 8155, 8155 timer, 8155 I/O ports in Handshake modes and its interfacing example, Interfacing 8355/8755 Programmable I/O ports, 8279 programmable keyboard/display interface and its interfacing example, 8255 Programmable peripheral interface, Block diagram of 8255, its different mode of operation, Interfacing A/D converter using 8255, Application of 8255 in Handshake mode, 8253 Programmable interval timer, programming 8263, 8253 as counter, 8259 programmable interrupt controller and its priority mode and other features, programming the 8259, 8257 DMA controller and its block diagram, example of application of 8257 DMA controller. Serial I/O and data communication: Synchronous and asynchronous transmission, Parity check, BAUD, RS 232 standard, Software versus programmable hardware approach, software controlled asynchronous serial I/O, 8085 serial I/O SOD and SID, Hardware controlled serial I/O using programmable chips, 8251 programmable communication interface and its block diagram, interfacing RS 232 Terminal using the 8251A

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Follow the external components (sensors, peripherals, PPIs, PICs, external memories) with computer systems in laboratory				P1								
CLO2	Execute different attractive real-life projects with the help of external components and controlling devices					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Imitation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4241

Contact Hours/Week: 3 Hours

Course Title: Computer Simulation and Modeling

Credit Hour: 3

Prerequisite:CSE 3231

Course Rationale:

This course centers around fostering the simulation and modeling information and abilities of understudies, expanding on the ideas from data designs and Algorithms in creating information structures for explicit reenactment model applications.

Course Content:

Simulation methods: Introduction to Simulation, Random number generator, analogue simulation of continuous system, Discrete system simulation, Simulation of a pert network, Statistical analysis of result, Validation and verification techniques, Application of simulation to problems e.g. business, operation research, operating system, Computer design, Introduction to simulation packages, Computer animation. Modeling: Introduction to modeling techniques, Problems, models and systems, Modeling concepts, Logic for (conceptual) modeling, Logic programming for conceptual modeling, Concepts of relational modeling and its practice. Some practical modeling e.g. Relational Database modeling, Different methods for Curves and surface modeling, Fractals, Polyhedral modeling with Euler's formula, Advanced modeling, Procedural models

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the importance of computer simulation and modeling in developing and managing any system.	C2											
CLO2	Generate simulation for problems related to business, operation research, operating system, computer design and environment and demonstrate the knowledge for sustainable and feasible solution.							C6					
CLO3	Create a model for a given set of information and induce its validity.			C6									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	J. A. Spriet	Computer Aided Modelling & Simulation, <i>Academic Press, Inc. Orlando, FL, USA.</i>	Link is provided in Google Class Room
2.	Richard Lehman	Computer Simulation and Modeling, <i>Lawrence Erlbaum Associates Publishers.</i>	Link is provided in Google Class Room
3.	G. Cordon	System Simulation, <i>Prentice Hall</i>	Link is provided in Google Class Room
4.	James D. Foley Andries van Dam	Computer Graphics, <i>Addison-Wesley.</i>	Link is provided in Google Class Room

Course Code: CSE 4242

Contact Hours/Week: 2 Hours

Course Title: Computer Simulation and Modeling Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course spurs to plan different models to think through real-world issues utilizing arithmetic, computer programming dialect, computation control etc.

Course Content:

Simulation methods: Introduction to Simulation, Random number generator, analogue simulation of continuous system, Discrete system simulation, Simulation of a pert network, Statistical analysis of result, Validation and verification techniques, Application of simulation to problems e.g. business, operation research, operating system, Computer design, Introduction to simulation packages, Computer animation. Modeling: Introduction to modeling techniques, Problems, models and systems, Modeling concepts, Logic for (conceptual) modeling, Logic programming for conceptual modeling, Concepts of relational modeling and its practice. Some practical modeling e.g. Relational Database modeling, Different methods for Curves and surface modeling, Fractals, Polyhedral modeling with Euler's formula, Advanced modeling, Procedural models.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Approach with diverse real world complex systems to devise the model of a system.				P3								
CLO2	Demonstrate the characteristics of the simulation result.					P5							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Naturalization)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE4251
Course Title: Multimedia Systems
Prerequisite: None
Rationale:

Contact Hours/Week: 3 Hours
Credit Hour: 3

A multimedia system combines a series of technologies to increase the range and depth of presentation, interaction and processing. It aims to introduce the student with the multimedia key issues, image processing, audio digitization, digital video technologies, and principles behind animation technique and acquaint them with hypermedia design and production.

Course Content:

Multimedia systems: introduction; Coding and compression standards; Architecture issues in multimedia. Operating systems issues in multimedia: real-time OS issues, synchronization, interrupt handling. Database issues in multimedia: indexing and storing multimedia data, disk placement, disk scheduling, searching for a multimedia document. Networking issues in multimedia: Quality-of-service guarantees, resource reservation, traffic specification, haping and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions; Security issues in multimedia: digital water-marking, partial encryption schemes for video streams. Multimedia applications: audio and video conferencing, video on demand, voice over IP. Networked virtual environment (NVE): Networked virtual environment overview; forms of distributed interaction; example systems; NVE technologies and challenges; origins of NVE.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Discuss indexing and storing multimedia data for multimedia document	C2											
CLO2	Solve and use the elements and principles of design in multimedia to further their profession			C3									
CLO3	Apply the knowledge acquired in developing multimedia applications – audio and video conferencing, video on demand, and VOIP.				C3								
CLO4	Discuss ethical and legal issues about modern technology and tools.								C2				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO	Domain/ level of Learning	Teaching-Learning	Assessment
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No.	Taxonomy	Strategy	Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	RZe-Nian Li and Mark S. Drew	Fundamentals of Multimedia,	Link is provided in Google Class Room
2.	John Villamil-Casanova and Louis Molina	Multimedia: An Introduction	Link is provided in Google Class Room
3.	Jose Lozano, Louis Molina and John Willif	Multimedia Sound and Video	Link is provided in Google Class Room

Course Code: CSE4252

Contact Hours/Week: 2 Hours

Course Title: Multimedia Systems Sessional

Credit Hour: 1

Prerequisite: None

Rationale:

This course deals with the design a multimedia system and learn different issues (Database issue, Network issue, Security issue). After completing this course, students will be able to design a multimedia system with considering those issues.

Course Contents:

Multimedia systems: introduction; Coding and compression standards; Architecture issues in multimedia. Operating systems issues in multimedia: real-time OS issues, synchronization, interrupt handling. Database issues in multimedia: indexing and storing multimedia data, disk placement, disk scheduling, searching for a multimedia document. Networking issues in multimedia: Quality-of-service guarantees, resource reservation, traffic specification, haping and monitoring, admission control; Multicasting issues; Session directories; Protocols for controlling sessions; Security issues in multimedia: digital water-marking, partial encryption schemes for video streams. Multimedia applications: audio and video conferencing, video on demand, voice over IP. Networked virtual environment (NVE): Networked virtual environment overview; forms of distributed interaction; example systems; NVE technologies and challenges; origins of NVE.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Discuss security issues, quality of services and networking issues of different multimedia elements in details.									A2			
CLO2	Implement and use the elements and principles of design in multimedia to further their profession.					P2							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Affective (Respond)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test

		<input type="checkbox"/> Others	<input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4261

Contact Hours/Week: 3 Hours

Course Title: E-Commerce

Credit Hour: 3

Prerequisite:CSE 2221, CSE 3121, HUM 4111

Course Rationale:

This course is designed to provide fundamental concepts and essential analytical and practical skills in E-Commerce.

Course Content:

E-Commerce Basics: E-Commerce Definition, Internet History and E-Commerce Development, Business-to-Business E-Commerce, Business-to-Consumer E-Commerce, E-Commerce Stages and Processes, E-Commerce Challenges, E-Commerce Opportunities.E-Commerce Options: Internet Access Requirements, Web Hosting Requirements, Entry-Level Options, Storefront and Template Services, E-Commerce Software Packages, E-Commerce Developers, E-Business Solutions.Marketing Issues: Online and Offline Market Research, Data Collection, Domain Names, Advertising Options, E-Mail Marketing, Search Engines, Web Site Monitoring, Incentives.Planning and Development: Web Site Goals, International Issues, Planning Stages, Resource Allocation, Content Development, Site Map Development, Web Site Design Principles, Web Site Design Tools, Web Page Programming Tools, Data-Processing Tools. E-Commerce Components: Navigation Aids, Web Site Search Tools, Databases, Forms, Shopping Carts, Checkout Procedures, Shipping Options. Payment Processing: Electronic Payment Issues, E-Cash, Credit Card Issues, Merchant Accounts, Online Payment Services, Transaction ProcessingMobile Commerce: Over view of M-Commerce, advantages and limitations, WML,Security Issues: Security Issues and Threats, Security Procedures, Encryption, Digital Certificates, SSL and SET Technologies, Authentication and Identification, Security Providers, Privacy Policies.E-Core values: Ethical, legal, taxation and international issuesCustomer Service: Customer Service Issues, E-Mail Support, Telephone Support, Live Help Services, Customer Discussion Forums, Value-Added Options. The WWW: HTTP protocol, HTML, XHTML, XML, JavaScript, CSS, DOMMagnetic Circuit and Concepts: Flux, fields, permeability reluctance, analysis of series, parallel and series- parallel magnetic circuit.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Able to describe the Fundamentals of E-Commerce and related terminologies	C1											
CLO2	Demonstrate E-Commerce business model and retailing in E-commerce by using the effectiveness of market research		C2										
CLO3	Demonstrate about the advertising and marketing the search and resource discovery paradigms and information search and retrieval			C3									
CLO4	Examine various E-commerce technologies to identify business models.										A2		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive	<input checked="" type="checkbox"/> Lecture	<input checked="" type="checkbox"/> Class Test

	(Analyze)	<input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input checked="" type="checkbox"/> Others	<input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Affective (Respond)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input checked="" type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Elias M. Awad	Electronic Commerce: From Vision to Fulfillment, <i>Prentice-Hall Inc.</i>	Link is provided in Google Class Room
2.	Jeffrey F., Rayport, Bernard J. Jaworsk	E-Commerce, <i>McGraw-Hill</i>	Link is provided in Google Class Room
3.	David Kosiur	Understanding Electronic Commerce, <i>Microsoft Press.</i>	Link is provided in Google Class Room
4.	Jeffrey F. Rayport, et al.	Introduction to E-Commerce, <i>McGraw-Hill.</i>	Link is provided in Google Class Room
5.	Debra Cameron	E-Commerce Security Strategies: Protection the Enterprise, <i>Computer Technology Research Corp</i>	Link is provided in Google Class Room

Course Code: CSE 4262

Course Title: E-Commerce Sessional

Prerequisite: None

Course Rationale:

This course is designed to provide fundamental concepts and essential analytical and practical

Contact Hours/Week: 2 Hours

Credit Hour: 1

skills in E-Commerce. The students will also be able to design a E-Commerce website project based on the acquired knowledge of this course.

Course Content:

E-Commerce Basics: E-Commerce Definition, Internet History and E-Commerce Development, Business-to-Business E-Commerce, Business-to-Consumer E-Commerce, E-Commerce Stages and Processes, E-Commerce Challenges, E-Commerce Opportunities. E-Commerce Options: Internet Access Requirements, Web Hosting Requirements, Entry-Level Options, Storefront and Template Services, E-Commerce Software Packages, E-Commerce Developers, E-Business Solutions. Marketing Issues: Online and Offline Market Research, Data Collection, Domain Names, Advertising Options, E-Mail Marketing, Search Engines, Web Site Monitoring, Incentives. Planning and Development: Web Site Goals, International Issues, Planning Stages, Resource Allocation, Content Development, Site Map Development, Web Site Design Principles, Web Site Design Tools, Web Page Programming Tools, Data-Processing Tools. E-Commerce Components: Navigation Aids, Web Site Search Tools, Databases, Forms, Shopping Carts, Checkout Procedures, Shipping Options. .Payment Processing: Electronic Payment Issues, E-Cash, Credit Card Issues, Merchant Accounts, Online Payment Services, Transaction Processing. Mobile Commerce: Over view of M-Commerce, advantages and limitations, WML, Security Issues: Security Issues and Threats, Security Procedures, Encryption, Digital Certificates, SSL and SET Technologies, Authentication and Identification, Security Providers, Privacy Policies. E-Core values: Ethical, legal, taxation and international issues. Customer Service: Customer Service Issues, E-Mail Support, Telephone Support, Live Help Services, Customer Discussion Forums, Value-Added Options. The WWW: HTTP protocol, HTML, XHTML, XML, JavaScript, CSS, DOM

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Codify the knowledge and application skills to the domain of E-commerce and business process services.										A4		
CLO2	Coordinate the process that should be followed in building an E-commerce website					P4							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Affective (Organization)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4271

Contact Hours/Week: 3 Hours

Course Title: Distributed Database Management Systems

Credit Hour: 3

Prerequisite: CSE 3231

Course Rationale:

This course is designed to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve efficiently, and effectively information from a Distributed DBMS. This course also motivates to optimize the advanced and distributed database transactions, query processing, concurrency control and other functions of database systems using advanced features that includes complex data and also assess various database models and designs to contribute to modern database systems.

Course Content:

Introduction: Distributed Data processing, Distributed database system (DDBMSS), Promises of DDBMSs, Complicating factors and Problem areas in DDBMSs, Overview Of Relational DBMS Relational Database concepts, Normalization, Integrity rules, Relational Data Languages, Relational DBMS Distributed DBMS Architecture: DBMS Standardization, Architectural models for Distributed DBMS, Distributed DBMS Architecture Distributed Database Design: Alternative design Strategies, Distribution design issues, Fragmentation, Allocation. Semantic Data Control: View Management, Data security, Semantic Integrity Control Overview Of Query Processing: Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing Introduction To Transaction Management: Definition of Transaction, Properties of transaction, types of transaction Distributed Concurrency Control: Serializability theory, Taxonomy of concurrency control mechanisms, locking bases

concurrency control algorithms. Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMS techniques, Parallel execution problems, Parallel execution for hierarchical architecture. Distributed Object Database Management systems: Fundamental Object concepts and Object models, Object distribution design. Architectural issues, Object management, Distributed object storage, Object query processing. Transaction management. Database Interoperability: Database Integration, Query processing,

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the distributed terminologies of database management system (DBMS).	C2											
CLO2	Apply database functions and packages suitable for enterprise database development and database management.				C3								
CLO3	Design solution for secure and sustainable development in terms of societal and environmental aspect.							C6					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term

		<input type="checkbox"/> Others	<input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	M.T. Ozsu and P. Valduriez	Principles of Distributed Database Systems, <i>Pearson</i> .	Link is provided in Google Class Room
2.	S. Ceri and G. Pelagatti	Distributed Databases principles and systems, <i>Tata McGraw Hill</i>	Link is provided in Google Class Room
3.	Andrew S. Tanenbaum	Distributed Database, <i>Pearson</i> .	Link is provided in Google Class Room

Course Code: CSE 4272

Contact Hours/Week: 2

Course Title: Distributed Database Management Systems

Hours

Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course motivates to design and develop embedded projects using advanced database functions and query based on advanced database models – object oriented database, distributed database, multimedia database etc. to solve real-life problems.

Course Content:

Introduction: Distributed Data processing, Distributed database system (DDBMSS), Promises of DDBMSs, Complicating factors and Problem areas in DDBMSs, Overview Of Relational DBMS Relational Database concepts, Normalization, Integrity rules, Relational Data Languages, Relational DBMS Distributed DBMS Architecture: DBMS Standardization, Architectural models for Distributed DBMS, Distributed DBMS Architecture Distributed Database Design: Alternative design Strategies, Distribution design issues, Fragmentation, Allocation. Semantic Data Control: View Management, Data security, Semantic Integrity Control Overview Of Query Processing: Query processing problem, Objectives of Query Processing, Complexity of Relational Algebra operations, characterization of Query processors, Layers of Query Processing Introduction To Transaction Management: Definition of Transaction, Properties of transaction, types of transaction Distributed Concurrency Control:

Serializability theory, Taxonomy of concurrency control mechanisms, locking bases concurrency control algorithms. Parallel Database Systems: Database servers, Parallel architecture, Parallel DBMS techniques, Parallel execution problems, Parallel execution for hierarchical architecture. Distributed Object Database Management systems: Fundamental Object concepts and Object models, Object distribution design. Architectural issues, Object management, Distributed object storage, Object query processing. Transaction management. Database Interoperability: Database Integration, Query processing.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Demonstrate architecture and design tradeoffs of all aspects of distributed database management systems.				P3								
CLO2	Develop a simple distributed database system with the fundamental tasks involved with modeling, designing, and implementing a DBMS.					P4							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Precision)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test

			<input type="checkbox"/> Others
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Capstone course/Internship/Thesis/Projects/Portfolio:

Course Code: CSE 4000

Contact Hours/Week: 12 Hours

Course Title: Project & Thesis

Credit Hour: 6

Prerequisite: None

Course Rationale:

This course is important to enable the students to develop an inquisitive mind and helps always to want to find out why things happen. The usefulness of project and thesis work is that it allows the student to organize his approach to solving the research problem. The significance of the project and thesis highlights the value that the project and thesis outcomes may provide in the field or real-world practice. It enables the students to gain sufficient knowledge on research areas through different ways.

Course Content:

A project/thesis course will be assigned to the students in 4th year 1st semester class and it will continue till 4th year 2nd semester. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgment. The results of the work should be submitted in the form of a dissertation, which should include appropriate drawings, charts, tables, references etc. Final assessment on this course will be done in 4th year 2nd semester.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the research strategy to carry out this research and achieve the goal.		C2										
CLO2	Discover the problems from research literatures to concern the societal and environmental need.			C3									

CLO3	Analyze various type of literature paper to explore the research field.					C4							
CLO4	Execute various design of research and project work using modern tools.					P2							
CLO5	Improve the communication skill with engineering community and society to complete the thesis survey effectively.										A5		
CLO6	Verify a real-life complex problem that attains by thesis & project materials for sustainable development.								A5				
CLO7	Discuss about the best solution using all the ideas of the group.									A2			
CLO8	Respond to social, technical and environmental problem through literature review and research.						A2						
CLO9	Organize a thesis & project considering the social, cultural, global, ethical, legal, health, environmental responsibilities along with cost effectness.								A4				
CLO10	Summerize the earned skills to execute the new plan and budget.											C5	
CLO11	Develop effective knowledge to solve a problem in real world situations.												A1

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO4	Psychomotor (Manipulation)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO5	Affective (Characerization by value)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO6	Affective (Characerization by value)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others

CLO7	Affective (Respond)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO8	Affective (Respond)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO9	Affective (Organization)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO10	Cognitive (Evaluate)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO11	Affective (Receive)	<input type="checkbox"/> Lab Experiments (Hands on Practice) <input checked="" type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input checked="" type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input checked="" type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: CSE 4200

Contact Hours/Week: 6 Hours

Course Title: Industrial Training

Credit Hour: 3

Prerequisite:None

Course Rationale:

This course is important to help students to develop their skills in the application of theory to practical knowledge. Industrial training helps to develop the skills and techniques which are directly relevant to their desired goals. Industrial Training also increases students' responsibility and good work habits. It enables the students to gain sufficient knowledge in real and practical world.

Course Content:

Student will be attached with the industries/service agencies for two weeks after completing their Third year first semester (before starting Third year second semester/during any vacation in Third year second semester) to gain practical knowledge. It is a 1-credit course and without completion of this course the student will not fulfill the requirements of B. Sc. Engineering Degree.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Receive the knowledge about actual working environment						A5						
CLO2	Combine the knowledge of professional engineering solutions for sustainable development.					P4							
CLO3	Understanding the ethical knowledge through discussion and case study								C2				

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Affective (Characterization by Value)	<input type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input checked="" type="checkbox"/> Industrial Visit	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulation)	<input type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input checked="" type="checkbox"/> Industrial Visit	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test

			<input type="checkbox"/> Others
CLO3	Cognitive (Understand)	<input type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input checked="" type="checkbox"/> Industrial Visit	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	M.T. Ozsu and P. Valduriez	Principles of Distributed Database Systems, <i>Pearson</i> .	Link is provided in Google Class Room
2.	S. Ceri and G. Pelagatti	Distributed Databases principles and systems, <i>Tata McGraw Hill</i>	Link is provided in Google Class Room
3.	Andrew S. Tanenbaum	Distributed Database, <i>Pearson</i> .	Link is provided in Google Class Room

Course Code: CSE 3200

Contact Hours/Week: 2 Hours

Course Title: Seminar

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is important to help students to develop their skills in seminars and workshops which encourage active engagement, passionate dialogue, enhancing students' skills and knowledge. Seminars improve the confidence among the individual students. A seminar allows for small groups of students to meet and discuss academic topics or required reading, as well as set goals for research and continuing investigation.

Course Content:

Students will work in groups or individually to prepare review articles on the corresponding topic of their thesis/project and will present before audience.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PL01	PL02	PL03	PL04	PL05	PL06	PL07	PL08	PL09	PL010	PL011	PL012
CLO1	Respond to social, technical and environmental problem through literature review and research												A4
CLO2	Imitate or manipulate practically in laboratory using modern tools					C4							

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Affective (Organization)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Viva <input checked="" type="checkbox"/> Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Demonstration <input type="checkbox"/> Lab test <input type="checkbox"/> Others

Other Engineering:

Course Code: EEE 1111
Course Title: Electrical Circuit

Contact Hours/Week: 3 Hours
Credit Hour: 3

Prerequisite:None

Course Rationale:

This course is important to know the fundamental knowledge, solutions techniques and different practical applications of electrical circuit both DC and AC. However, it can evaluate the performance of circuits or networks. After studying this course, students will be able to analyze various electrical circuits which are the fundamentals for an electrical and electronic engineer.

Course Content:

Fundamental concepts and units, Variables and parameters: Voltage, current, power, energy, independent and dependent sources, resistance. Basic laws: Ohm's law, Kirchhoff's current and voltage laws, Joule's law. Simple resistive circuits: Series and parallel circuits, voltage and current division, Wye-Delta transformation. Techniques of circuit analysis: Nodal and mesh analysis including supernode and supermesh. Network theorems: Source transformation, Thevenin's, Norton's and superposition theorems with applications in circuits having independent and dependent sources, Millman's theorem, Compensation theorem, Maximum power transfer theorem and Reciprocity theorem. Source Concept: Sources of E.M.F, primary and secondary cells. Energy storage elements: Inductors and capacitors, series & parallel combination of inductors and capacitors. Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve. Laws of magnetic circuits: Ohm's law and Ampere's circuital law. Magnetic circuits: series, parallel and series-parallel circuits. Introduction to measuring instruments: Ammeter, voltmeter, galvanometer and wattmeter. Alternating Current circuits: Introduction to alternating current circuits, instantaneous, average and R.M.S values, complex impedance and phasor algebra, Power relations in A/C circuits: real, reactive and apparent power, power factor, power factor improvement.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe different DC circuit elements and learning different theorems to solve circuit problems	C1											
CLO2	Apply basic circuit theorems in DC domain and application.			C3									
CLO3	Analyze DC electrical circuits consisting of different circuit elements.		C2										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Jacob Millman and Christos C. Halkias	Electronic Devices and Circuits, <i>McGraw-Hill Inc.</i>	Link is provided in Google Class Room
2.	Albert D. Helfrick and William David Cooper	Modern Electronics Instrumentation and Measurement Techniques, <i>Prentice Hall</i>	Link is provided in Google Class Room
3.	A.K. Sowhney	A Course in Electrical and Electronic Measurements and Instrumentation, <i>Dhanpat Rai and Co.</i>	Link is provided in Google Class Room
4.	Albert Paul Malvino	Electronic Principles, <i>Career Education</i>	Link is provided in Google Class Room

Course Code: EEE 1112

Contact Hours/Week: 2 Hours

Course Title: Electrical Circuit Sessional

Credit Hour: 1

Prerequisite: None

Course Rationale:

This course is designed to teach about practical experiments on fundamental concepts, theorems,

different circuit problems.

Course Content:

Fundamental concepts and units, Variables and parameters: Voltage, current, power, energy, independent and dependent sources, resistance. Basic laws: Ohm’s law, Kirchhoff’s current and voltage laws, Joule’s law. Simple resistive circuits: Series and parallel circuits, voltage and current division, Wye-Delta transformation. Techniques of circuit analysis: Nodal and mesh analysis including supernode and supermesh. Network theorems: Source transformation, Thevenin’s, Norton’s and superposition theorems with applications in circuits having independent and dependent sources, Millman’s theorem, Compensation theorem, Maximum power transfer theorem and Reciprocity theorem. Source Concept: Sources of E.M.F, primary and secondary cells. Energy storage elements: Inductors and capacitors, series & parallel combination of inductors and capacitors. Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve. Laws of magnetic circuits: Ohm’s law and Ampere’s circuital law. Magnetic circuits: series, parallel and series-parallel circuits. Introduction to measuring instruments: Ammeter, voltmeter, galvanometer and wattmeter. Alternating Current circuits: Introduction to alternating current circuits, instantaneous, average and R.M.S values, complex impedance and phasor algebra, Power relations in A/C circuits: real, reactive and apparent power, power factor, power factor improvement.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Build various electrical circuits and networks.				P2								
CLO2	Analyze the performance of different electrical networks.		C4										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lab Experiments (Hands On Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
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Course Code: EEE 1211

Contact Hours/Week: 3 Hours

Course Title: Basic Electronics Circuit

Credit Hour: 3

Prerequisite:None

Course Rationale:

This course is important to know the fundamental knowledge of electronics and evaluate the performance of electronic circuits or networks. After studying this course, the students will be able to analyze semiconductor devices which are the fundamentals for an electronics engineer.

Course Content:

Semiconductor diode characteristics: Qualitative and Quantitative theory of the p-n junction as a diode; ideal p-n junction, p-n junction band diagram, current components in p-n diode, volt-ampere characteristics, transition and diffusion capacitance, dynamic resistance, reverse breakdown, avalanche and zener breakdown, zener diode. Rectifier Diode: controlled & uncontrolled rectification, Special-Purpose Diodes: Tunnel diode, varactor diode, and breakdown diode, metal oxide semi-conductor diode, optical diode, PIN diode, schottky diode, current regulator diode.

Introduction to BJT, SCR, TRIAC, DIAC, BJT, FET, MOSFET.

Introduction to operational amplifiers: Basic linear and nonlinear applications. Frequency response, bandwidth and other practical limitation of op-amps, compensation techniques. Feedback concept, Improvement of amplifier characteristics by negative feedback. Classification, analysis of feedback amplifier. Sinusoidal oscillators: Concept and its classification. Active filters. Negative impedance converters.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	CLO Statements	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the basic knowledge of diodes, transistors and amplifiers.	C2											

CLO2	Explain the operation of semiconductor devices.		C2										
CLO3	Apply the knowledge of different types of semiconductor and electronic devices in real life.						C3						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Jacob Millman and Christos C. Halkias	Electronic Devices and Circuits, McGraw-Hill Inc.	Online Availability
2.	Albert D. Helfrick and William David Cooper	Modern Electronics Instrumentation and Measurement Techniques, Prentice Hall	Link is provided in Google Class Room
3.	A.K. Sowhney	A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai and Co.	Link is provided in Google Class Room
4.	Albert Paul Malvino	Electronic Principles, Career Education	Link is provided in Google Class Room
5.	Jacob Millman and Christos C. Halkias	Electronic Devices and Circuits, McGraw-Hill Inc.	Link is provided in Google Class Room
6.	Albert D. Helfrick and William David Cooper	Modern Electronics Instrumentation and Measurement Techniques, Prentice Hall	Link is provided in Google Class Room

Course Code: EEE 1212**Contact Hours/Week: 2 Hours****Course Title: Basic Electronics Circuit****Credit Hour: 1****Sessional****Prerequisite:** None**Course Rationale:**

This course is important to make the students familiar with the electronic circuits and give them experimental skills. The purpose of the laboratory experiments is to verify the performance of electronics components diode, BJT, SCR etc. It enables the students to gain sufficient knowledge on the use of computer for simulation of electronic circuits through different circuit simulation tools. The students will also be able to design a hardware project based on the acquired knowledge of this course.

Course Content:

Sessional based on the theory of course EEE 2103. Course content of EEE 2103 is as follows: Semiconductor diode characteristics: Qualitative and Quantitative theory of the p-n junction as a diode; ideal pn junction, pn junction band diagram, current components in p-n diode, volt-ampere characteristics, transition and diffusion capacitance, dynamic resistance, reverse breakdown, avalanche and zener breakdown, zener diode. Rectifier Diode: controlled & uncontrolled rectification, Special-Purpose Diodes: Tunnel diode, varactor diode, and breakdown diode, metal oxide semi-conductor diode, optical diode, PIN diode, schottky diode, current regulator diode.

Introduction to BJT, SCR, TRIAC, DIAC, BJT, FET, MOSFET.

Introduction to operational amplifiers: Basic linear and nonlinear applications. Frequency response, bandwidth and other practical limitation of op-amps, compensation techniques. Feedback concept, Improvement of amplifier characteristics by negative feedback.

Classification, analysis of feedback amplifier. Sinusoidal oscillators: Concept and its classification. Active filters. Negative impedance converters.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	CLO Statements	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Construct various circuits and networks using different electronic elements.					P4							
CLO2	Analyze the performance of different electronic networks.				C4								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

General Education Courses:

Course Code: Math 1111
Course Title: Calculus and Complex Variable

Contact Hours/Week: 3 Hours
Credit Hour: 3

Prerequisite:None

Course Rationale:

To provide the basic concepts of differential and integral calculus and complex variable.

Course Content:

Functions: Domain, Range, Inverse function and graphs of functions, Composition of function, Limits, Continuity, Indeterminate form. Ordinary Differentiation: Differentiability, Differentiation, Successive differentiation and Leibnitz theorem. Expansions of functions: Rolle's Theorem, Mean value theorem, Taylor's and Maclaurin's formulae. Maximum and minimum of functions of one variable. Partial Differentiation: Euler's theorem, Tangents and normal, Asymptotes. Indefinite Integrals: Method of substitution, Integration by parts, Special trigonometric functions and rational fractions. Definite Integrals: Fundamental theorem, General properties, Evaluations of definite integrals and reduction formulas. Multiple Integrals: Determination of lengths, Areas and Volumes. Complex variable: Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorems; Complex differentiation and the Cauchy-Riemann equations, Mapping by elementary functions, Line Integral of a complex function, Cauchy's Integral theorem, Cauchy's Integral formula, Liouville's theorem, Taylor's theorem and Laurent's theorem. Singular points, Residue, Cauchy's Residue theorem. Evaluation of residues, Contour integration, Conformal mapping.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Define the basic terms of calculus and complex variable.	C1											
CLO2	Understand the basic concept of calculus and complex variable.		C2										
CLO3	Apply the concepts of calculus and complex variable to real world phenomena.			C3									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Cognitive (Remembering)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Applying)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	J. B. Conway	Functions of one complex variable	Link is provided in Google Class Room
2.	L. V. Ahlfors	Complex Analysis	Link is provided in Google Class Room
3.	Das and Mukherji	Differential Calculus and Integral Calculus	Link is provided in Google Class Room

Course Code: Math 1211

Contact Hours/Week: 3 Hours

Course Title: Algebra, Co-ordinate Geometry and Vector Analysis

Credit Hour: 3

Prerequisite: None

Course Rationale:

This course will introduce the fundamentals of algebra, vector analysis and co-ordinate geometry for engineering fields

Course Content:

Algebra: Algebra of sets, De Morgan's rule, relation & function. Determinants: Properties and Cramer's rule, Theory of Equations: Theorem, relation between roots and coefficients. Solution of cubic equations, De Moivre's theorem: Deduction from De Moivre's theorem, Functions of complex arguments. Gregory's series. Summation of series. Hyperbolic functions. Vector Analysis: Addition and subtraction of vectors, scalar and vector product of two vectors, Differentiation and integration of vectors, line, surface and volume integrals. Gradient of a scalar function, divergence and curl of a vector function. Physical significance of gradient, divergence and curl. Conservative systems. Gauss's divergence theorem, Stoke's theorem and green's theorem, and their applications in engineering problems. Co-ordinate Geometry: Co-ordinate Geometry of two dimension-Change of axis, Transformation of co-ordinates, simplification of equations of curves. Co-ordinate Geometry of three-dimension System of co-ordinates, distance between two points, section formula, projection, direction cosines, equations of planes and lines.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the physical explanation of different algebraic, vector notation and basic concept of two- and three-dimensional geometry.	C1											
CLO2	Apply differentiation and integration on vector valued functions			C3									
CLO3	Calculate length, volume and area of objects related to engineering study by using vector.		C3										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Dr. Muhammad AbdusSattar	Vector analysis	Link is provided in Google Class Room
2.	Murray R Spiegel (Schaum Series)	Vector analysis	Link is provided in Google Class Room
3.	Rahman & Bhattacharjee	A text Book on Co-ordinate Geometry (Two and Three Dimensions) with vector analysis.	Link is provided in Google Class Room
4.	Abdur Rahman	Higher Algebra	Link is provided in Google Class Room

Course Code: Math 2111

Contact Hours/Week: 3 Hours

Course Title: Linear Algebra, Matrices and Differential Equation

Credit Hour: 3

Prerequisite: None

Course Rationale:

To provide knowledge of formation, classification, order and application of Linear Algebra,

Differential Equation and also give the fundamental knowledge of matrices.

Course Content:

Linear Algebra: Vector space, subspace, sum and direct sum. Linear dependence and independence, basis and dimension. Range, kernel, nullity, rank, singular and non-singular transformations. Matrix representation of a linear operator. Change of basis, similarity. Matrices and linear mappings. Matrices: Definition, equality, addition, subtraction, multiplication, transposition, inversion, rank. Vector space and linear transformations. Eigen values and eigen vectors. Application of eigen values to systems of differential equations. Differential Equation: Degree and order of ordinary differential equations. Solution of first order differential equations by various methods. Solutions of linear equations of second and higher order with constant coefficients. Solution of homogeneous linear equations. Solution of higher order differential equations in absence of dependent/independent variables. Series solutions of differential equations, the Frobenius method.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Clarify differential equations of various types and Linear algebra.	C2											
CLO2	Solve different types of Linear algebraic problem and differential equations		C3										
CLO3	Analyze the engineering problems by differential equation methods			C4									
CLO4	Understand the concept of matrices	C2											

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	S. L. Ross	Differential Equations	Link is provided in Google Class Room
2.	H. T. H. Piaggio	Differential Equations	Link is provided in Google Class Room
3.	Raisinghania	Ordinary and Partial Differential Equations	Link is provided in Google Class Room
4.	C. C. McDuffe	Theory of Matrices	Link is provided in Google Class Room
5.	S. Lipschutz	Linear Algebra	Link is provided in Google

			Class Room
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References:

Course Code: Stat 2211

Contact Hours/Week: 3 Hours

Course Title: Statistics for Engineers

Credit Hour: 3

Prerequisite:None

Course Rationale:

To provide in deep idea of working with data sets and impact of data sets as well as application of queuing models in Computer Science domain.

Course Content:

Descriptive statistical data: Meaning and scope of statistics, Sources and type of statistical data, Representation of statistical data, Location, Dispersion and their measures. Skewness, Kurtosis and their measures. Moment and Cumulants and Practical examples. Probability: Concept of probability. Sample Space, Events union and Intersection of Events. Probability of events. Laws of probability, Conditional probabilities, Bayes' Theorem, Chebyshev's Inequality and Practical examples. Random variables and probability Distribution: Basic concepts, Discrete and continuous random variables, Density and distributional functions, Mathematical expectation and variance, Joint marginal and conditional density functions, Conditional Expectation and conditional variance, Moments and Cumulant generating functions. Characteristic function. Study of Binomial, Poisson, Normal and Bivariate Normal distribution and Practical examples. Linear Regression and Correlation: Correlation, Rank correlation, Partial and Multiple correlations. Linear Regression for two variables. Principle of Least Squares Method. Lines of

best fit Residual Analysis and examples. Test of Significance: Basic ideas of Null hypothesis. Alternative hypothesis. Type-I error, Type-II error, level of significance, Degree of freedom, Rejection region and Acceptance region. Test of Single mean, Single variance, two sample means and variances. Test for 2x2 contingency tables. Independence test and practical examples.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO1 ₀	PLO1 ₁	PLO1 ₂
CLO1	Discuss the theories of applied statistics.	C2											
CLO2	State the Residue Theorem and apply it when appropriate to calculate a contour integral			C1									
CLO3	Explain what is meant by entire, holomorphic and harmonic functions.		C2										
CLO4	Apply the mathematical concepts learned to various areas of CSE.												C3

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	A. J. B. Anderson	Interpreting Data. <i>Chapman and Hall, London</i>	Link is provided in Google Class Room
2.	H. Cramer	The Elements of Probability Theory. <i>Wiley, N. Y</i>	Link is provided in Google Class Room
3.	P. Hoel,	Introductory Statistics, <i>Wiley and Sons, N. Y.</i>	Link is provided in Google Class Room
4.	D. V. Lindley	Introduction to Probability and Statistics. Vol-1 <i>C. U. P. London</i>	Link is provided in Google Class Room
5.	S. Lipschutz	Probability, <i>McGraw-Hill, N. Y.</i>	Link is provided in Google Class Room

Course Code: Math 2211

Contact Hours/Week: 3 Hours

Course Title: Numerical Analysis

Credit Hour: 3

Prerequisite:None

Course Rationale:

The course will introduce the fundamentals of Fourier analysis and Laplace transform for engineering and applied science streams.

Course Content:

loating-point arithmetic: Floating-point representations, General properties, IEEE-754, 32-bit and 64-bit formats, Denormalized numbers, NaNs and other special values, Floating-point exception handling, CRAY, Rounding methods, Floating-point operations (+, -, X, /), Catastrophic cancellation due to subtraction; introduction to the concept of condition number
Approximations and Errors: Accuracy and Precision, Error Definitions, Round-Off Errors, Truncation Errors.
Roots of Equations: Graphical Methods, The Bisection Method, The False-Position Method, Simple One-Point Iteration, The Newton-Raphson Method, The Secant Method.
Systems of linear algebraic equations: Gauss Elimination, Solving Small Numbers of Equations, Naive Gauss Elimination, Pitfalls of Elimination Methods, Matrix Inversion and Gauss –Seidel, The Matrix Inverse, Error Analysis and System Condition.
Curve Fitting: Linear Regression, Polynomial Regression, Multiple Linear Regression, Newton’s Divided-Difference Interpolating Polynomials, Lagrange Interpolating Polynomials, Coefficients of an Interpolating Polynomials, Curve Fitting with sinusoidal Functions.
Numerical Differentiation and Integration: The Trapezoidal Rule, Simpson’s Rules, Integration with Unequal Segments, Romberg Integration, Gauss Quadrature, High-Accuracy Differentiation Formulas, Richardson Extrapolation, Derivatives of Unequally Spaced Data.
Finite-difference methods for ordinary differential equations: Solution of linear, homogeneous difference equations with constant coefficients, Survey of methods for deriving finite-difference algorithms, Stability analysis of finite-difference methods: Euler, backward Euler, Midpoint, Trapezoidal, Midpoint-trapezoidal predictor-corrector, Runge-Kutta methods, Adams-Moulton methods, Adams-Bashforth methods. Methods for stiff equations: Backward Euler, Gear's methods. Methods for linear systems of ODEs in which the coefficient matrix has purely imaginary eigenvalues, Finite-difference methods as digital filters: Transfer-function analysis, Boundary-value problems for ODEs
Numerical Solutions of Ordinary Differential Equations: Euler’s Method, Modifications and Improvements of Euler’s Methods, Runge-Kutta Methods, Adaptive Runge-Kutta Methods. Pseudorandom-number generators, the FFT.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PL01	PL02	PL03	PL04	PL05	PL06	PL07	PL08	PL09	PL010	PL011	PL012
CLO1	Understand the basic knowledge of Numerical Analysis.	C2											
CLO2	Apply Numerical Analysis in electrical circuits and communication system		C3										
CLO3	Analyze engineering problems with fundamental engineering transformation techniques like Numerical Analysis			C4									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Applying)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyzing)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Steven C. Chapra	Numerical Methods for Engineers; <i>McGraw-Hill</i> Raymond P. Canale	Link is provided in Google Class Room
2.	S. S. Kuo	Computer Applications of Numerical Methods, <i>AddisonWesley</i>	Link is provided in Google Class Room

Course Code: Math 2212

Contact Hours/Week: 3 Hours

Course Title: Numerical Analysis Sessional

Credit Hour: 3

Prerequisite:None

Course Rationale:

The course will introduce the application of fundamentals of Fourier analysis and Laplace transform for engineering and applied science streams.

Course Content:

Floating-point arithmetic: Floating-point representations, General properties, IEEE-754, 32-bit and 64-bit formats, Denormalized numbers, NaNs and other special values, Floating-point

exception handling, CRAY, Rounding methods, Floating-point operations (+, -, X, /), Catastrophic cancellation due to subtraction; introduction to the concept of condition number Approximations and Errors: Accuracy and Precision, Error Definitions, Round-Off Errors, Truncation Errors. Roots of Equations: Graphical Methods, The Bisection Method, The False-Position Method, Simple One-Point Iteration, The Newton-Raphson Method, The Secant Method. Systems of linear algebraic equations: Gauss Elimination, Solving Small Numbers of Equations, Naive Gauss Elimination, Pitfalls of Elimination Methods, Matrix Inversion and Gauss –Seidel, The Matrix Inverse, Error Analysis and System Condition. Curve Fitting: Linear Regression, Polynomial Regression, Multiple Linear Regression, Newton’s Divided-Difference Interpolating Polynomials, Lagrange Interpolating Polynomials, Coefficients of an Interpolating Polynomials, Curve Fitting with sinusoidal Functions. Numerical Differentiation and Integration: The Trapezoidal Rule, Simpson’s Rules, Integration with Unequal Segments, Romberg Integration, Gauss Quadrature, High-Accuracy Differentiation Formulas, Richardson Extrapolation, Derivatives of Unequally Spaced Data. Finite-difference methods for ordinary differential equations: Solution of linear, homogeneous difference equations with constant coefficients, Survey of methods for deriving finite-difference algorithms, Stability analysis of finite-difference methods: Euler, backward Euler, Midpoint, Trapezoidal, Midpoint-trapezoidal predictor-corrector, Runge-Kutta methods, Adams-Moulton methods, Adams-Bashforth methods. Methods for stiff equations: Backward Euler, Gear's methods. Methods for linear systems of ODEs in which the coefficient matrix has purely imaginary eigenvalues, Finite-difference methods as digital filters: Transfer-function analysis, Boundary-value problems for ODEs Numerical Solutions of Ordinary Differential Equations: Euler’s Method, Modifications and Improvements of Euler’s Methods, Runge-Kutta Methods, Adaptive Runge-Kutta Methods. Pseudorandom-number generators, the FFT.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs):

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Analyze Numerical Analysis, electrical circuits and communication system					C4							
CLO2	Imitate engineering problems with fundamental engineering transformation techniques like Numerical Analysis				P4								

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Cognitive (Analyzing)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Articulate)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Steven C. Chapra	Numerical Methods for Engineers; <i>McGraw-Hill</i> Raymond P. Canale	Link is provided in Google Class Room
2.	S. S. Kuo	Computer Applications of Numerical Methods, <i>AddisonWesley</i>	Link is provided in Google Class Room

GED Courses:

Course Code: Ban 1111

Contact Hours/Week: 4 Hours

Course Title: বাংলাভাষাওসাহিত্য

Credit Hour: 4

Prerequisite: None

Course Rationale:

সাহিত্যহলোমানবমনেরবহুবর্ণিলপ্রকাশ।আমরাবাঙালি, আমাদেররাষ্ট্রভাষাবাংলা।অসংখ্যতাজাপ্রাণওরক্তেরবিনিময়েএকমাত্রবাঙালিকেইরক্ষাকরতেহয়েছেতাদেরনিজভাষারসন্মান।আজএভাষাঅর্জনকরেছেআন্তর্জাতিকমাতৃভাষারস্বীকৃতি।ধ্বনিপরিচয়থেকেশুরুকরেব্যবহারিকবাংলাসহসাহিত্যেরনানাবিধপঠনপাঠনেরবিষয়েআলোকপাতেরমাধ্যমেশিক্ষার্থীকেমানবজীবনেরসামাজিক, রাজনৈতিক, মানবিকজ্ঞানদানকরাসম্ভব।বাংলাভাষাওসাহিত্যেরজ্ঞানঅর্জনেরমধ্যদিয়েবাঙালিরআদিথেকেশুরুকরেবর্তমানকালপর্যন্তটিকেথাকারজন্যনানাআন্দোলন-সংগ্রামওগৌরবগাথাযেমনরাষ্ট্রভাষাআন্দোলন, শিক্ষাআন্দোলন, ছয়দফাআন্দোলন, গণ-আন্দোলনওমুক্তিযুদ্ধেরমাধ্যমেঅর্জিতস্বাধীনতাসম্পর্কেধারণালাভকরতেপারবে।সর্বোপরি,

একোসাধ্যয়নেরমাধ্যমেশিক্ষার্থীএকজনযোগ্যওসুদক্ষনাগরিকহিসেবেনিজেকেসমাজেপ্রতিষ্ঠিত করারসুযোগপাবে।

Course Content:

প্রথমখণ্ড: ভাষাওনির্মিতিভাষা: বাংলাধ্বনিওবর্ণ, স্বরওব্যঞ্জন, বাংলাস্বরধ্বনিওস্বরবর্ণ, বাংলাব্যঞ্জনধ্বনিওব্যঞ্জনবর্ণেরউচ্চারণ, সংযুক্তব্যঞ্জনবর্ণ, সাধুওচলিত (প্রমিত) ভাষা, বাংলাবানানেরনিয়ম, যতিবঙ্গানুবাদ।নির্মিতি।প্রতিবেদনবারিপোর্টঃনিবন্ধঃক, একুশেফেব্রুয়ারি: খ. মুক্তিযুদ্ধ, বাংলানববর্ষ, বাংলারলোকসংস্কৃতি।দ্বিতীয়খণ্ড: সাহিত্য, কবিতা: আবদুলহাকিম- বঙ্গবাণী; মাইকেলমধুসূদনদত্ত- বঙ্গভাষা: রবীন্দ্রনাথঠাকুর- নির্ঝরেরস্বপ্নভঙ্গ: কাজীনজরুলইসলাম- আজসৃষ্টিসুখেরউল্লাসে; জীবনানন্দদাশ- বাংলারমুখআমি; হাসানহাফিজুররহমান- অমরএকুশে, শামসুররাহমান- তোমাকেপাওয়ারজন্যেহে স্বাধীনতা; ছোটগল্পওঅন্যান্যরচনা: রবীন্দ্রনাথঠাকুর- পোস্টমাস্টার; বিভূতিভূষণবন্দ্যোপাধ্যায়- পুঁইমাচা: আখতারুজ্জামানইলিয়াস- অপঘাত।প্রবন্ধ: বঙ্কিমচন্দ্রচট্টোপাধ্যায়- বাঙ্গালাভাষা: রবীন্দ্রনাথঠাকুর-সভ্যতারসংকট।

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO	Course Learning Outcomes (CLO)	PLOs														
		PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12			
CLO 1	বাংলাভাষাওসাহিত্যেরজ্ঞানলাভকরেতারসঠিকব্যবহারওবিকাশঘটাবে।	C2														
CLO 2	বাংলাভাষাওসাহিত্যপাঠেরমাধ্যমেইতিহাস, ঐতিহ্য, সভ্যতা, সংস্কৃতিওজীবনদর্শনসম্পর্কেজ্ঞান অর্জনকরেচেতনাকেজাগ্রতকরবে।								A3							
CLO 3	সাহিত্যপাঠেরমাধ্যমে। সাহিত্যিকেরমননশীলওসৃজনশীলদৃষ্টিভঙ্গিঅনুধাবনেরমাধ্যমেবাস্তব তাসম্পর্কেধারণাঅর্জনকরবে।															A2
CLO 4	বাংলাভাষারশুদ্ধপ্রয়োগেরমাধ্যমেপ্রমিতউচ্চারণওশুদ্ধবানানেরযথাযথব্যবহারকরেব্যবহারিকওকর্মমুখীদক্ষতাঅর্জন													A5		
CLO 5	নৈতিকওমানবিকমূল্যবোধেরমাধ্যমেচেতনারবিকাশঘটিয়েসমাজওদেশেরউন্নয়নেসহায়কভূমিকারাখবে।															C3

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term

		<input type="checkbox"/> Others	<input type="checkbox"/> Others
CLO2	Affective (Characterization by value)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Mid-Term <input type="checkbox"/> Others
CLO3	Affective (Respond)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Mid-Term <input type="checkbox"/> Others
CLO4	Affective (Characterization by value)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input checked="" type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Mid-Term <input type="checkbox"/> Others
CLO5	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)
1.	রফিকুলইসলাম, সৌমিত্রশেখর	বাংলাভাষাওসাহিত্য
2.	হায়াৎ মামুদ	বাংলালেখারনিয়মকানুন
3.	মাহবুবুলহক	বাংলাবানানেরনিয়ম
4.	গোপালহালদার	বাংলাসাহিত্যেররূপরেখা (১মও২য়খণ্ড)
5.	আবদুলআলীম	বাংলাবানানওউচ্চারণশিক্ষা
6.	নরেনবিশ্বাস	বাংলাউচ্চারণঅভিধান
7.	মুহম্মদশহীদুল্লাহ	বাংলাসাহিত্যেরকথা (১মও২য়খণ্ড)
8.	অসিতকুমারবন্দ্যোপাধ্যায়	বাংলাসাহিত্যেরসম্পূর্ণইতিবৃত্ত

Course Code: Phy1111
Course Title: Electricity, Optics, Waves & Modern Physics

Contact Hours/Week: 3 Hours
Credit Hour: 3

Prerequisite:None

Course Rationale:

The importance of studying Physics is very profound in every engineering subject because physics strengthens quantitative reasoning and problem-solving skills. This course is designed to understand core concepts of electromagnetism, waves and oscillations, and modern physics. This basic physics course will help the students to learn how to analyze complex problems

Course Content:

Electrostatics: Electric dipole, field due to a dipole, Gauss's law and its application. Electromagnetic Induction: Faraday's law, Ampere's law, Biot-Savart's law, motional e.m.f.; self and mutual inductance, galvanometers- moving coil, ballistic and deadbeat types. Waves and Oscillations: Oscillations: Simple Harmonic Motion, Transverse and Longitudinal nature of waves: Travelling and Standing waves. Intensity of a wave. Sound waves: Propagation and speed of sound in fluid and solid media, Doppler's effect; Infrasonic and Ultrasonic. Thermodynamics: Zeroth law of Thermodynamics, First law of thermodynamics, work done during adiabatic and isothermal processes, Second law of thermodynamics, Carnot's cycle, Carnot's engine, thermionic emission, entropy changes in reversible and an irreversible process. Optics: Theories of light: Huygens's principle and construction. Interference of light. Young's double slit experiment, Fresnel bi-prism, Newton's ring, Interferometers. Diffraction of light: Fresnel and Fraunhofer diffraction, Diffraction by single and double slit, diffraction gratings. Polarization: Production and analysis of polarized light, Optical activity, Optics of crystals. Atom models: Rutherford atom model, Bohr atom model, Particle properties of waves: Photoelectric effect, Einstein's photoelectric equation, Laws of photoelectric emission, Compton Effect, Quantum effect: de Broglie waves. Radioactivity: introduction to radioactivity, characteristics of alpha, beta particles and gamma rays, Laws of radioactive disintegration, Half-life, mean life, practical application of radioactivity. Nuclear energy: Fission and fusion process, mass distribution, energy distribution, chain reaction, binding energy, nuclear force, nuclear reactor. Semiconducting physics: Band theory, Semiconducting materials, p-type and n-type materials, semiconductor devices

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Explain different types of laws and phenomenon based on electromagnetism, waves and vibration, optics and modern physics.	C2											
CLO2	Derive different types of equations of electromagnetism, waves and vibration, optics and modern physics.		C4										

Course Code: Phy 1112

Contact Hours/Week: 2 Hours

Course Title: Electricity, Optics, Waves & Modern

Credit Hour: 1

Physics Sessional

Prerequisite:None

Course Rationale:

This course is designed to provide students with fundamental concepts of measuring the value of galvanometer constant, the value of g by compound pendulum, mutual inductance of two coils, characteristics of different basic semiconductor devices.

Course Content:

Sessional based on the theory of course Phy 1111. Course content of Phy 1111 is as follows: Electrostatics: Electric dipole, field due to a dipole, Gauss's law and its application. Electromagnetic Induction: Faraday's law, Ampere's law, Biot-Savart's law, motional e.m.f.; self and mutual inductance, galvanometers- moving coil, ballistic and deadbeat types. Waves and Oscillations: Oscillations: Simple Harmonic Motion, Transverse and Longitudinal nature of waves: Travelling and Standing waves. Intensity of a wave. Sound waves: Propagation and speed of sound in fluid and solid media, Doppler's effect; Infrasonic and Ultrasonic. Thermodynamics: Zeroth law of Thermodynamics, First law of thermodynamics, work done during adiabatic and isothermal processes, Second law of thermodynamics, Carnot's cycle, Carnot's engine, thermionic emission, entropy changes in reversible and an irreversible process. Optics: Theories of light: Huygens's principle and construction. Interference of light. Young's double slit experiment, Fresnel bi-prism, Newton's ring, Interferometers. Diffraction of light: Fresnel and Fraunhofer diffraction, Diffraction by single and double slit, diffraction gratings. Polarization: Production and analysis of polarized light, Optical activity, Optics of crystals. Atom models: Rutherford atom model, Bohr atom model, Particle properties of waves: Photoelectric effect, Einstein's photoelectric equation, Laws of photoelectric emission, Compton Effect, Quantum effect: de Broglie waves. Radioactivity: introduction to radioactivity, characteristics of alpha, beta particles and gamma rays, Laws of radioactive disintegration, Half-life, mean life, practical application of radioactivity. Nuclear energy: Fission and fusion process, mass distribution, energy distribution, chain reaction, binding energy, nuclear force, nuclear reactor. Semiconducting physics: Band theory, Semiconducting materials, p-type and n-type materials, semiconductor devices.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the working mechanism of different devices like galvanometer, diode, transistor and use them in experiments.	C2											
CLO2	Perform different experiments to determine the value of g, galvanometer constant, mutual inductance					P2							

and characteristics of diode, transistor etc.													
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Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others

Course Code: Eng 1211

Contact Hours/Week: 4 Hours

Course Title: Introduction to English Language & Literature

Credit Hour: 4

Prerequisite:None

Course Rationale:

This course aims at providing practice in reading, writing, speaking, and listening skills of English. Reading skill will focus on guessing word meaning, understanding sentence meaning, scanning, skimming, general comprehension, and summarizing, writing skills will cover writing correct sentences, generating ideas, planning, and writing with good organization. Focus will be on techniques of paragraph and essay development. The course will also provide practice in listening and speaking skills. There will be some literary texts for reading also.

Course Content:

Introducing self, describe a place, person etc. Formal & informal conversationsound recognition, word recognition, listening for specific meaning and general comprehension. Reading for details or general comprehension, summarizing, predicting, guessing word meaning, understanding sentence meaning. Formal and informal letter writing, paragraph, and essay writing.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Discuss with others in English.										A2		
CLO2	Understand literary & nonliterary English texts.	C2											
CLO3	Develop their listening skill.			A1									
CLO4	Compose different sorts of writings like paragraph & essays.		C6										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Affective (Receiving)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understanding)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Affective (Respond)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project

			<input type="checkbox"/> Others
CLO4	Cognitive (Create)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	P.B. Shelley	Ozymandias	Link is provided in Google Class Room
2.	Robert Browning	My Last Duchess	Link is provided in Google Class Room
3.	Alfred Tennyson	The Lotos Eaters	Link is provided in Google Class Room
4.	Robert Frost	Stopping by Woods on a Snowy Evening.	Link is provided in Google Class Room
5.	Katherine Mansfield	The Garden Party	Link is provided in Google Class Room
6.	Earnest Hemingway	Old Man at the Bridge	Link is provided in Google Class Room
7.	Jonathan Swift	Gulliver's Travels: Voyage to Lilliput	Link is provided in Google Class Room
8.	George Orwell	Animal Farm	Link is provided in Google Class Room

Course Code: Chem 1211

Contact Hours/Week: 3 Hours

Course Title: Physical & Inorganic Chemistry

Credit Hour: 3

Prerequisite:None

Course Rationale:

This course is important to know the fundamental knowledge of chemical bonds and evaluate the performance of acid-base titration. After studying this course, the students will be able to analyze different theorems and solutions which are the fundamentals for a chemical engineer.

Course Content:

Different types of chemical bonds and their properties. Modern concepts of acids and bases. Problems involving acid base titration. Properties and uses of noble gases. Electrochemistry, Mechanism of electrolytic conduction, Transport number, Kohl-Rausch's law. Ionization of water and concept of pH. Different types of cells, Cell e.m.f. Single electrode potentials, their determination and application. Secondary Cells or Accumulators, lead accumulator and alkaline accumulator. Different types of solutions. Factors influencing the solubility of a substance, solution of gas in liquids. Colligative properties of dilute solution. Le-chatelier's theorem and some of its important industrial applications. Thermochemistry, chemical kinetics. Bond energy terms, enthalpy, entropy, and thermodynamics of the formation of ionic and covalent compounds. The driving force of a reaction, lattice energy, Born-Haber cycle, energy of hydration, energy change of the solution process, ionization energies, electronegativity, electron affinity. Radioactivity, patterns of nuclear stability, nuclear transmutations, rates of radioactive decay, detection of radioactivity, energy changes in nuclear reactions, nuclear fission, nuclear fusion, isotopes, isobar, isomers, methods of separation of isotopes, applications of radioisotopes, biological effects of radiation.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Describe the basic knowledge of chemical bonds and their properties	C1											
CLO2	Discuss about different types of law, titration, and ionization process ensure human safety.						A2						
CLO3	Explain the operation of different types of cells and solution		C2										

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project

			<input type="checkbox"/> Others
CLO2	Affective (Respond)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Mid-Term <input type="checkbox"/> Others
CLO3	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	R. D. Madan	Modern Inorganic Chemistry	Link is provided in Google Class Room
2.	M. M. Haque and M. A. Nawab	Principles of Physical Chemistry	Link is provided in Google Class Room
3.	Esmarch S. Gilreath	Fundamental Concepts in Inorganic Chemistry	Link is provided in Google Class Room
4.	G. M. Barrow	Physical Chemistry	Link is provided in Google Class Room

Course Code: Chem 1212

Contact Hours/Week: 2 Hours

Course Title: Physical & Inorganic Chemistry

Credit Hour: 1

Sessional

Prerequisite: None

Course Rationale:

This course is important to make the students familiar with different types of solution and cells and give them experimental skills. The purpose of the laboratory experiments is to verify the performance of titration and solution. It enables the students to gain sufficient knowledge on

the use of laboratory equipment for different experiment.

Course Content:

Different types of chemical bonds and their properties. Modern concepts of acids and bases. Problems involving acid base titration. Properties and uses of noble gases. Electrochemistry, Mechanism of electrolytic conduction, Transport number, Kohl-Rausch's law. Ionization of water and concept of pH. Different types of cells, Cell e.m.f. Single electrode potentials, their determination and application. Secondary Cells or Accumulators, lead accumulator and alkaline accumulator. Different types of solutions. Factors influencing the solubility of a substance, solution of gas in liquids. Colligative properties of dilute solution. Le-chatelier's theorem and some of its important industrial applications. Thermochemistry, chemical kinetics. Bond energy terms, enthalpy, entropy, and thermodynamics of the formation of ionic and covalent compounds. The driving force of a reaction, lattice energy, Born-Haber cycle, energy of hydration, energy change of the solution process, ionization energies, electronegativity, electron affinity. Radioactivity, patterns of nuclear stability, nuclear transmutations, rates of radioactive decay, detection of radioactivity, energy changes in nuclear reactions, nuclear fission, nuclear fusion, isotopes, isobar, isomers, methods of separation of isotopes, applications of radioisotopes, biological effects of radiation.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Build different types of solution including liquid and gases				P2								
CLO2	Analyze the performance of Verify the performance of different acid-base titration and cells for various environment friendly applications.							A5					

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
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CLO1	Psychomotor (Manipulation)	<input checked="" type="checkbox"/> Lab Experiments (Hands on Practice) <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input checked="" type="checkbox"/> Lab test <input type="checkbox"/> Others
CLO2	Affective (Characterization by value)	<input checked="" type="checkbox"/> Lab Experiments <input type="checkbox"/> Simulation/Emulation <input checked="" type="checkbox"/> Lab Demonstration <input type="checkbox"/> Mini-Project <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Quiz <input checked="" type="checkbox"/> Lab Viva <input checked="" type="checkbox"/> Lab Report <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project Demonstration <input type="checkbox"/> Lab test

Course Code: Hum 2111

Contact Hours/Week: 4 Hours

Course Title: Bangladesh Studies

Credit Hour: 4

Prerequisite:None

Course Rationale:

The rationale of the course is to give an outline to the students about the sources of the history of ancient, medieval, and modern Bengal. This course also provides knowledge about the social, cultural, and political aspects of Bangladesh.

Course Content:

Unit 1: Topography of Ancient Bengal, Townships of Ancient Bengal, Shashanka, Pala, and Sena Dynasties. Unit 2: Turkish Conquests, IlyasShahi Dynasty, Hussain Shahi Dynasty, Akbar's Conquest of Bengal, Bara Bhuiyas and Nawabi Periods, War of Palashi and East India Company, Civil Procedure, Battle of Buxar. Unit 3: British Foundation of Government, Lord Warren Hastings, Lord Cornwallis and Permanent Settlement, Social and Administrative Reforms, Lord Ripon, William Bentinck, Sepoy Mutiny and Rise of Nationalism, Indian Congress and Muslim League, People of Bengal, Ram Mohan Roy, Abdul Latif, Syed Amir Ali, Causes and Reactions to the Partition of Bengal, Non-Cooperation and Khilafat Movement, Lahore Proposal and India Division. Unit 4: Awami League, Language Movement, Cultural Movement, United Front Elections, Six-Part Movement, People's Uprising, 1970 Elections, Bangladesh's Freedom Struggle. Unit 5: Liberation war and literary and cultural development after 1971, politics after liberation war.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO NO.	Course Learning Outcomes (CLO)	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	PLO 12
CLO1	Recognize the inner significance of the emergence of Bangladesh as a nation and make them patriotic nationals.										C1		
CLO2	Realize the glorious history of Bengali civilization and communal harmony among the people in comparison to the other parts of the globe.				C4								
CLO3	Analyze the important aspects of social, political, religious, and economic themes of the ancient, medieval and modern Bengal.		C4										
CLO4	Identify the major sources of history, the religious and other movement of medieval Bengal, Muslim rule, British rule, western education, and factors behind the growth of Hindu and Muslim middle class.					C1							
CLO5	Know the various development and the heroic efforts of the political parties, leaders, and student leaders to become an independence in 1971.												C1

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Midterm <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Midterm <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Midterm <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Midterm <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO5	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Midterm <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)
1.	মুনতাসীরমামুনওমো. মাহবুবররহমান	স্বাধীনবাংলাদেশেরঅভ্যুদয়েরইতিহাস
2.	মোস্তুফাকামাল	বাঙ্গালী, বাংলাদেশওবঙ্গবন্ধু
3.	নীহাররঞ্জনরায়	বাঙালীরইতিহাস : আদিপর্ব
4.	সুখময়মুখোপাধ্যায়	বাংলারইতিহাসেরদুশোবছর: স্বাধীনসুলতানদেরআমল
5.	মোহাম্মদহান্নান	বাংলাদেশেরমুক্তিযুদ্ধেরইতিহাস

Course Code: Hum 2211**Contact Hours/Week: 4 Hours****Course Title: Financial Accounting & Economics****Credit Hour: 4****Prerequisite:**None**Course Rationale:**

The rationale of this course is to provide the basic concepts and standards underlying financial accounting systems and economics. The course emphasizes the assembly of the basic financial accounting statements, the income statement, owner's equity statement and balance sheet as well as their interpretation and the basic principles of economics and an exposure to a range of applications of the theory in real world problems.

Course Content:

Basic Concepts of Economics: Definition and subject matter of Economics; Microeconomics vs macroeconomics; Law of Economics; Central economic problems of every society; Different economic systems; Economics and Engineering. Theory of Demand, Supply and Consumer Behavior: Law of Demand; Demand schedule and demand curve; Supply law, Supply schedule and supply curve; Shift in demand and supply; Equilibrium in the market; Elasticity of demand and supply Production and Costs and Theory of the Firm: Meaning of production; Factors of production; Concepts of total, average and marginal costs, fixed and variable costs. Theory of the Firm: Perfect competition and monopoly; Total, average and marginal revenue of a firm; Average and marginal revenue under perfect competition and monopoly; Firm's Equilibrium; Equilibrium of firm under perfect competition and monopoly. The Input-Output Analysis: Meaning of input-output analysis; Input-output analysis model; balance equation; coefficient

matrix; Determination of final demand vector. Basic Concepts of Macroeconomics: Growth; Unemployment; Inflation; Philips Curve, Business cycle; Circular flow of economics; Two, three and four sector economics. National Income accounting and determination: Concepts of GNP, GDP and national income; Methods of national income accounting; Problems of national income accounting; Keynesian model of national income determination; The multiplier; Effect of fiscal policy in the Keynesian model. Budgets of Bangladesh: The revenue at the capital budget; Income, expenditure of the government; direct and indirect taxes. Development Planning in Bangladesh: Need for planning in Bangladesh; Various five-year plans in Bangladesh; Development strategies in the five-year plans of Bangladesh.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the key ideas that define the economic and accounting method of thinking as a Engineer.	C2											
CLO2	Analyse familiarity with a range of micro as well as macroeconomic and financial statements issues.		C3										
CLO3	Demonstrate substantial knowledge on fundamental economic question of allocating scarce resources, principles of demand, supply, market price and cost accounting evolution, Meaning, objectives, scope concepts of costs.			C3									

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Midterm <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Midterm <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input checked="" type="checkbox"/> Midterm <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	K. K. Dewett	Modern Economic Theory, <i>S. Chand Publishers</i>	Link is provided in Google Class Room
2.	H.L Ahuja	Advanced Economic Theory, <i>S. Chand Publishers</i>	Link is provided in Google Class Room
3.	M. C. Shukla	Business Organization and Management, <i>S. Chand Publisher.</i>	Link is provided in Google Class Room
4.	Harold Koontz and Heinz Weihrich	Management, <i>Tata McGraw-Hill.</i>	Link is provided in Google Class Room

Course Code: Hum 4111

Contact Hours/Week: 4 Hours

Course Title: Project Planning and Management

Credit Hour: 4

Prerequisite:None

Course Rationale:

This course aims to provide the opportunity to the students to develop an understanding to Manage the scope, cost, timing, and quality of the project at all times focused on project success. With the help of this course the students also can implement general business concepts, practices, and tools to facilitate project success in future. They can also appraise the role of project management in organization change.

Course Content:

Introduction: Concept of Project, Feature and types of Projects, Project Cycle, Concept of Project Management, Elements and functions of Project Management, Importance and Challenges of Project Management Qualities, Functions, and responsibilities of a project manager. Project Formulation and Appraisal: Concept of Project Formulation, Stages of Project Formulation, Problem of Project Formulation, Problem of Project formulation, Financial Feasibility Study-PBP, NPV, IRR, Project appraisal, Cost Benefit Analysis (SCBA). Project

Plan: Concept, Steps, Importance, Failure of Project Plan. Project Schedule: Concept, Steps to successful schedules, Objectives of scheduling, Scheduling Tools, Gantt Charts, Network Techniques- Critical Path Method (CPM), PERT. Project Cost Estimation: Concept, Tools, and Techniques for Cost Estimation Financial Analysis: Pricing Project Costs and Benefits. Project Risk Analysis: Definition of Risks, Types of project risks, Techniques of measuring risks, Managing Project risks. Project Implementation: Concept, Steps in Project Implementation, Impediment to Project Implementation, Guideline to effective Project Implementation. Monitoring, evaluation, and termination of Project: Techniques of monitoring, precondition of effective monitoring, Methods of Evaluation, different status of project termination. Project Management in Bangladesh: Procedures of preparation and approval of development projects in Bangladesh, Organization, and functions of planning commission, ECNEC and IMED, Problems of Project implementation in Bangladesh

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Recognize project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.										A1		
CLO2	Apply project management knowledge, processes, lifecycle and the embodied concepts, tools, and techniques in order to achieve project success.				C3								
CLO3	Adapt technology tools for communication, collaboration, information management, and decision support.					P4							
CLO4	Understand general business concepts, practices, and tools to facilitate project success.						C2						

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment

Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Affective (Receive)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Psychomotor (Articulation)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input checked="" type="checkbox"/> Mid-Term <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	K. K. Dewett	Modern Economic Theory, <i>S. Chand Publishers</i>	Link is provided in Google Class Room
2.	H.L Ahuja	Advanced Economic Theory, <i>S. Chand Publishers</i>	Link is provided in Google Class Room
3.	M. C. Shukla	Business Organization and Management, <i>S. Chand Publisher.</i>	Link is provided in Google Class Room

4.	Harold Koontz and Heinz Weihrich	Management, <i>Tata McGraw-Hill</i> .	Link is provided in Google Class Room
5.	PMBOK	Project Management Body of Knowledge	

Course Code: Hum 3111

Contact Hours/Week: 4 Hours

Course Title: Normative and Meta Ethics

Credit Hour: 4

Prerequisite:None

Course Rationale:

Ethics is a branch of philosophy which study human conducts and evaluate them in terms of ethical standard and moral values. The question of what is right', 'what is wrong', 'what is good', 'what is bad', are the core concern of ethics. This course is concerned with the fundamental ethical questions related to human life and it is designed to provide students basic knowledge on morality, values, and ethical behavior

Course Content:

Unit 1(Definition, scope, and kinds of normative ethics; and relation with other disciplines): Definition and scope of Ethics; Normative ethics, Meta-ethics, and Practical ethics. Origin of ethics, Relation of ethics to metaphysics, religion, and psychology. Unit 2 (Various actions, psychological basis, and postulates): Moral, immoral and non-moral actions, psychological basis of morality, desire, universe of desires and conflict of desires, motive and intention, postulates of morality; nature and object of moral judgment. Unit 3(Moral standards, various stages of moral standard and various perspectives of moral standard): Various perspectives of moral standard; the external versus internal moral standards: the law of the Tribe, Society. State and God; Hedonism and its classification, Intuitionism, Rationalism Perfectionism. Unit 4(Moral pathology): Moral pathology: Concept of moral evil, vice, sin, crime; Various theories of punishment. Unit 5 (Various perspectives of virtues): Virtue: The meaning of virtue, Socrates: virtue is knowledge; Plato's treatment of the virtue, Aristotle's concept of virtue. Unit 6(Moral progress): Moral progress: different stages or conditions in the evolution of moral life; conditions of moral progress in individual; possibility of moral progress. Unit 7 (Meta-ethics and main theories of meta ethics): Definition of meta-ethics, Non-naturalism, Emotivism, Prescriptivism, Multi-functionalism, Descriptivism.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning

Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Knowabout the definition, scope and kinds of normative ethics and relation with other disciplines						C1						
CLO2	Explain various actions, psychological basis, and postulates								C2				
CLO3	Analyzethe moral standards, various												C4

	stages of moral standard and various perspectives of moral standard												
CLO4	Develop moral pathology and moral progress										A1		
CLO5	Seek various perspectives of virtues and meta-ethics and main theories of meta ethics										A3		

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Remember)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyzing)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Affective (Receive)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

CLO5	Affective (Value)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
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References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	ABM Mahbul Islam & Md. Sahadat Hossain	Application of Ethics morals Manners and Laws Bangladesh Institute of Islamic Thought.	Link is provided in Google Class Room
2.	G. E. Moore	Principia Ethica	Link is provided in Google Class Room
3.	Immanuel Kant	Fundamental Principles of the Metaphysic of Morals Trans Thomas Kingsmill Abbott	Link is provided in Google Class Room
4.	Immanuel Kant	Critique of Practical Reason Trans	Link is provided in Google Class Room
5.	Jadunath Sinha	A Manual of Ethics	Link is provided in Google Class Room
6.	John Stuart Mill	Utilitarianism	Link is provided in Google Class Room
7.	William Lillie	An Introduction to Ethics	Link is provided in Google Class Room

Course Code: Hum 3211

Contact Hours/Week: 4 Hours

Course Title: Introduction to Law

Credit Hour: 4

Prerequisite:None

Course Rationale:

This course reflects on the nature of legal rules and the underlying meaning of legal concept. It comprises philosophy of law and to reflect on the known rules of law, what it is for a rule to be a legal rule, and what distinguishes law from morality, etiquette, and other related phenomena. This course also comprises some legal theories of law which serve to emphasis the different facets of law and build up a complete picture of legal concepts. There will be an attempt to describe the function and operation of law in society.

Course Content:

Historical Development of Law, Nature and Classification of Laws, Law, and Morals Sources of Law, Theories of Punishment, Forms of Punishment, Law and Society, Role of Law in the Development of the Society Traffic Rules of Bangladesh & Fine, Muslim succession, the

Consumer Rights Protection Act- 2009, Digital Security Act- 2018, Muslim family law ordinance, ICT Act-2006, Legal Awareness, Social Value of Law, Public Interest Litigation, Alternative Dispute Resolution, Emergence of Bangladesh, Framing of the Constitution of Bangladesh, Proclamation of Independence Order, Supremacy of the Constitution, Features of Bangladesh Constitution, Preamble, Supremacy of the Constitution, Fundamental Principles of State Policy and Fundamental Rights their Enforcement, Emergency Provisions, Amendment Procedure; The President- Modes of Election and Terms of Office, Power and Functions, Legislative Power, Ordinance Making Power, Immunities and Prerogative of Mercy, Impeachment and Removal of the President, Non-Party Care-Taker Government: Composition, Functions and Debates; Local Government, Defense Services; Terms and Tenure of office, Power and Functions of the Prime Minister and different Ministers, Ministerial Responsibility and Accountability; Parliament, Its Composition, Powers and Functions, Privileges and Immunities, Qualification and Disqualification for Election to Parliament, Legislative and Financial or Fiscal Powers and Procedures, Delegated Legislation, Powers and Functions of the Speaker and Deputy Speaker, Sovereignty of the Parliament, Vacation of Seat of the Members of Parliament; Composition, Structure, Jurisdiction and Powers of the Supreme Court, Appointment of the Judges, Superintendence of Subordinate Courts, Separation of Powers, Administrative Tribunals, Supreme Judicial Council, Attorney General, Constitutional Remedies, Ombudsman, Writ, Judicial Review; Establishment and Functions of the Election Commission; RPO 1972, Code of Conduct 2013.

Course Learning Outcomes (CLOs) and Mapping of CLOs with Program Learning Outcomes (PLOs)

CLO No.	Course Learning Outcomes (CLO)	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1	Understand the relation of State and law and be able to use the legal mechanism for enforcing legal rights.									C2			
CLO2	Demonstrate skills to determine right and wrong, breach of rights and duties along with the knowledge of prescribing proper punishment.								C3				
CLO3	Differentiate among different types of sources of law and the hierarchy of the sources in different legal systems.						C4						
CLO4	Conscious about the constitution of Bangladesh												A3

Mapping Course Learning Outcomes (CLOs) with the Teaching-Learning & Assessment Strategy:

CLO No.	Domain/ level of Learning Taxonomy	Teaching-Learning Strategy	Assessment Strategy
CLO1	Cognitive (Understand)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO2	Cognitive (Apply)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input checked="" type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO3	Cognitive (Analyze)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input checked="" type="checkbox"/> Class Test <input type="checkbox"/> Assignment <input checked="" type="checkbox"/> Mid-Term <input checked="" type="checkbox"/> Final Exam <input type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others
CLO4	Affective (value)	<input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Interaction <input type="checkbox"/> Audio/Video <input type="checkbox"/> Others	<input type="checkbox"/> Class Test <input checked="" type="checkbox"/> Assignment <input type="checkbox"/> Mid-Term <input type="checkbox"/> Final Exam <input checked="" type="checkbox"/> Presentation <input type="checkbox"/> Project <input type="checkbox"/> Others

References:

SL No.	Author(s)	Text Book/Reference Book(s)	Online Availability
1.	Halim and Abdul	Constitution, Constitutional Law and Politics: Bangladesh Perspective	Link is provided in Google Class Room
2.	Kamal and Mustafa	Bangladesh Constitution: Trends and Issues	Link is provided in Google Class Room
3	Mahajan, V. D.	Jurisprudence & Legal Theory:	Link is provided in Google Class Room