

Undergraduate Curriculum 2021



Department of Civil Engineering
Dhaka University of Engineering & Technology, Gazipur

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Preface

Dhaka University of Engineering & Technology (DUET), Gazipur, is one of the reputed universities for the study of Engineering in Bangladesh. DUET is surrounded by scenic beauty and is located in the busy industrial area of Gazipur, Bangladesh. Only the Diploma in Engineering graduates can enroll here for four years Bachelor degree in different Engineering branches. The University originated in 1980 as College of Engineering at its temporary campus at Tejgaon, Dhaka, under the University of Dhaka offering four years 'Bachelor degree in Civil, Electrical & Electronic and Mechanical Engineering' to meet the growing need for advanced engineering education in Bangladesh. After a short span of time, the College of Engineering was renamed Dhaka Engineering College (DEC). Then DEC was shifted to its present permanent campus at Gazipur in 1983. DEC was converted to Bangladesh Institute of Technology (BIT), Dhaka, as a degree-awarding Institute by a government ordinance in 1986 to find solutions to various problems it had been facing since its inception. The journey of BIT, Dhaka, was not also so smooth. It faced many problems and had overcome some of the issues faced by DEC. To alleviate the existing problems, from September 2003, Dhaka University of Engineering & Technology, Gazipur was created out of BIT, Dhaka. DUET has ultimately turned into an Institution, which can now boost its commitment to quality engineering education and has established a good reputation all over the world for the quality of its graduates. The curriculum and syllabus of DUET are continuously updated to cope with the recent technological development as well as in line with that is being followed in the universities of developed countries. To provide students with hands-on training, an industrial attachment program is included in the curriculum. DUET addresses practical needs through undergraduate and graduate programs. At present, all efforts are being made to turn the DUET into a center of excellence. At present, there are four faculties in the university: (a) The Faculty of Civil Engineering; this Faculty comprises the Department of Civil Engineering and Department of Architecture (b) The Faculty of Electrical and Electronic Engineering; this Faculty comprises the Department of Electrical and Electronic Engineering and Department of Computer Science and Engineering (c) The Faculty of Mechanical Engineering; this Faculty comprises the Department of Mechanical Engineering, Department of Textile Engineering, Department of Industrial and Production Engineering, Department of Chemical and Food Engineering, and Department of Materials and Metallurgical Engineering (MME) and (d) The Faculty of Science; this Faculty comprises the Department of Chemistry, Department of Mathematics, Department of Physics and Department of Humanities and Social Sciences. At present, undergraduate and graduate programs (M.Sc./M Engg./M Phil and Ph.D.), masters and Doctor of Philosophy degrees are offered at the University.

The pace of development of DUET towards perfection has already been started. DUET will continue its efforts to turn itself into a center of excellence for providing quality education by fulfilling the various strategic aims and objectives to which it is committed.

PART A

Title of the Program

B.Sc. in Civil Engineering

Name of the University

Dhaka University of Engineering & Technology, Gazipur

1. Vision of the University

To be the center of excellence for quality education, research and innovation.

Mission of the University

- To provide a congenial environment for world-class education, research and innovation.
- To produce highly efficient technical professionals endowed with practical knowledge, skills and ethical values based on emerging demands.
- To promote multi-faceted academic collaboration across universities and industries for research and innovation.
- To contribute in national policy making for sustainable socio-economic and industrial development of the country.
- To provide consultancy in solving technical problems at national and international levels.

Name of the Degree : B. Sc. in Civil Engineering
Name of the Faculty Offering the Program : Faculty of Civil Engineering
Name of the Department Offering the Program : Department of Civil Engineering

2. Vision of the Program

To produce Civil Engineers having technical competence, professional and leadership qualities for the contribution towards socio-economic development at national and global levels.

Mission of the Program

M1	To provide need-based curriculum for producing competent and professional Civil Engineers.
M2	To impart knowledge that leads to better professional skill and leadership quality among the graduates.
M3	To encourage students to pursue higher education and participate in competitive exams and various career development courses to excel the national and global levels.
M4	To promote research and consultancy on contemporary issues for fulfilling the academic and socio-economic needs.
M5	To offer different programs that enable students to become an entrepreneur and expert who can contribute to make the world sustainable.
M6	To motivate the students towards developing moral and ethical values.

Description of the Program

Civil Engineering is universally considered as the cornerstone of almost all fields of engineering science. The various disciplines of civil engineering are ubiquitous, not only in simple to complex applications of industry, but also in our quotidian everyday life. Therefore, any engineering educational program should consider the inherent multi-disciplinary characteristics of civil engineering major. The Department of Civil Engineering of Dhaka University of Engineering & Technology, Gazipur has undergone several stages of evolution and progress since its establishment in 1980. Today, congruent with 21st century's requirements and in harmony with modern branches of science, such as Nanotechnology or Bio-Mechanics, Mechatronics, and emergence of modern methods of education such as virtual or e-learning and long life self-learning skills, the civil engineering curricula has been programmed based on new paradigms and futuristic visions to prepare engineers for confronting the societal and ethical aspects of their professional life and the challenges of modern technologies. The Department's academic program can be divided basically into undergraduate and graduate education. It has always tried to keep a well-defined and logical balance between endeavors towards undergraduate and graduate programs. At the undergraduate level, the program focuses on educating and training qualified engineers to commence their profession on the industrial and service/commercial sectors with high management and leadership skills.

The Department of Civil Engineering, DUET, Gazipur has been offering an undergraduate program (B. Sc in Civil Engineering) since its inception of 1980. The course curricula have been designed compatible with the existing and emerging needs of the industry. The university's autonomy is a privilege to the department in terms of flexibility provided to add, modify and revise courses/syllabi at different time intervals to cater to contemporary needs of the industrial concerns. The laboratories have also been initiated and modernized with the assistance of the government and university grants commission of Bangladesh. The department shows no hesitation in imbibing valuable suggestions of eminent experts from World-class Institutions while framing teaching schemes or course curricula.

3. Program Education Objectives

The Civil Engineering undergraduate program is designed to prepare students for continued learning and successful careers in industry, government, academia, and consulting. Our graduates are expected to be:

PEO1	Knowledgeable and technically competent in civil engineering discipline in line with the industry requirement.
PEO2	Capable to design, investigate and solve civil engineering problems innovatively, creatively using modern tools through sustainable approach.
PEO3	Able to achieve professional and leadership qualities to work in a team, organization and society with ethical values.
PEO4	Able to communicate and manage projects successfully and to recognize the need of lifelong learning for successful career advancement.

4. Program Learning Outcome (PO)

The B.Sc. in Civil program learning outcomes (POs) are aligned with ABET Engineering Accreditation Commission (EAC) outcomes. These are stated as:

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, analyze, formulate complex civil engineering problems, and reach substantiated conclusions using first principles of mathematics, the natural sciences and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex civil engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
PO4	Investigation: Conduct investigations of real-life problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5	Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to civil engineering activities with an understanding of limitations.
PO6	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 civil engineering practice.
PO7	Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics, responsibilities, and the norms of the engineering practice.
PO9	Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
PO10	Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Knowledge Profile

	Attribute
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
K3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	Civil engineering knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the civil engineering discipline
K5	Knowledge that supports engineering design in civil engineering area
K6	Knowledge of engineering practice (technology) in the practice areas in the civil engineering discipline
K7	Comprehension of the role of engineering in society and identified issues in engineering practice in the civil engineering discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability
K8	Engagement with selected knowledge in the research literature of the civil engineering discipline

Range of Complex Engineering Problem Solving

Attribute	Complex Engineering Problems have characteristic P1 and some or all of P2 to P7:
Depth of knowledge required	P1 : Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2 : Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	P3 : Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	P4 : Involve infrequently encountered issues
Extent of applicable codes	P5 : Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	P6 : Involve diverse groups of stakeholders with widely varying needs
Interdependence	P7 : Are high level problems including many component parts or sub-problems

Range of Complex Engineering Activities

Attribute	Complex activities mean (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	A2: Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering, or other issues
Innovation	A3: Involve creative use of engineering principles and research-based knowledge in novel ways
Consequences for society and the environment	A4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches

5. PEO to Mission Statement Mapping

M/PEO	PEO1	PEO2	PEO3	PEO4
M1	√	√	√	-
M2	√	-	√	-
M3	√	√	-	√
M4	-	√	√	-
M5	-	√	√	√
M6	-	-	√	√

6. Mapping of POs to PEOs

PEO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	√	√	√	-	√	-	-	-	-	√	-	-
PEO2	-	√	√	√	√	-	√	-	-	-	-	-
PEO3	-	-	-	-	-	√	-	√	√	√	√	-
PEO4	-	-	-	-	-	-	-	-	-	√	√	√

PART B

7. Scheme of the Program

Summary of Course Plan

Sl. No.	Year/ Semester	Theory		Sessional		Total Credit
		No. of Course	Credit	No. of Course	Credit	
1.	1 st /1 st *	5	13.00	5	4.50	17.50
2.	1 st /2 nd	5	17.00	3	2.25	19.25
3.	2 nd /1 st	5	16.00	4	5.25	21.25
4.	2 nd /2 nd	5	15.00	5	6.00	21.00
5.	3 rd /1 st	5	19.00	3	3.75	22.75
6.	3 rd /2 nd	5	17.00	4	3.75	20.75
7.	4 th /1 st	5	16.00	3	3.00	19.00
8.	4 th /2 nd	5	12.00	3	9.00	21.00
Total		40	125.00	30	37.50	162.50

** 1st year 1st- semester courses are exempted because of candidate's 4-year Diploma in Engineering background after 10 years of schooling.*

[Notes on course number allocation

1st digit for Year

2nd digit for Civil Engineering (CE) courses:

- 0 : Basic Engineering*
- 1 : Structural Engineering*
- 2 : Water Resources Engineering*
- 3 : Geotechnical Engineering*
- 4 : Environmental Engineering*
- 5 : Transportation Engineering*

For Basic Science and Humanities courses 1: Civil Engineering Department

3rd and 4th digits for course serial number in a year]

C: Compulsory Course

O: Optional Course

7.1 Scheme of 1st Year 1st Semester (Exempted)

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	HSS 1101	Accounting and Sociology	3	3.00	Exempted
02	EEE 1101	Basic Electrical Technology	3	3.00	-
03	CE 1000	Civil Engineering Drawing	3/2	0.75	-
04	CE 1001	Surveying	3	3.00	-
05	CE 1002	Surveying Sessional	3/2	0.75	-
06	CE 1003	Engineering Materials I	2	2.00	-
07	CE 1005	Details of Construction	2	2.00	-
08	CE 1006	Quantity Survey	3	1.50	-
09	CE 1008	Computer Aided Drafting	3/2	0.75	-
10	CE 1010	Welding and Carpentry Shop	3/2	0.75	-
Total:			22.00	17.50	

7.2 Scheme of 1st Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	Math 1101	Differential and Integral Calculus	3	3.00	C
02	Phy 1101	Heat, Properties of Matter, Waves, Electricity and Magnetism	3	3.00	C
03	Phy 1102	Properties of Matter, Heat and Electricity Sessional	3/2	0.75	C
04	Ch 1101	Chemistry	4	4.00	C
05	Ch 1102	Chemistry Sessional	3/2	0.75	C
06	HSS 1103	English and Economics	4	4.00	C
07	HSS 1104	English Sessional	3/2	0.75	C
08	CE 1011	Analytic Mechanics	3	3.00	C
Total:			21.50	19.25	

7.3 Scheme of 2nd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	Math 2101	Differential Equations, Laplace Transform and Harmonics	4	4.00	C
02	Phy 2101	Optics, Structure of Solid and Modern Physics	3	3.00	C
03	Phy 2102	Waves, Oscillations, Optics and Magnetism Sessional	3/2	0.75	C
04	HSS 2102	English Language Skill Development	3	1.50	C
05	CE 2001	Engineering Materials II	3	3.00	C
06	CE 2002	Engineering Materials II Sessional	3	1.50	C
07	CE 2003	Mechanics of Solids I	3	3.00	C
08	CE 2005	Fluid Mechanics	3	3.00	C
09	CE 2006	Fluid Mechanics Sessional	3	1.50	C
Total:			26.50	21.25	

7.4 Scheme of 2nd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	Math 2103	Matrices, Fourier Series and Vector Analysis	3	3.00	C
02	CE 2007	Engineering Geology and Geomorphology	3	3.00	C
03	CE 2009	Mechanics of Solids II	3	3.00	C
04	CE 2010	Mechanics of Solids Sessional	3	1.50	C
05	CE 2012	Computer Programming Sessional	3	1.50	C
06	CE 2014	Architectural, Engineering and Planning Appreciation	3	1.50	C
07	CE 2101	Design of Concrete Structures I	3	3.00	C
08	CE 2016	Detailing of Reinforced Concrete	3/2	0.75	C

09	CE 2201	Open Channel Flow	3	3.00	C
10	CE 2202	Open Channel Flow Sessional	3/2	0.75	C
Total:			27.00	21.00	

7.5 Scheme of 3rd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	Math 3101	Numerical Methods and Statistics	4	4.00	C
02	CE 3002	Engineering Computation Sessional	3	1.50	C
03	CE 3101	Structural Analysis	4	4.00	C
04	CE 3103	Design of Concrete Structures II	4	4.00	C
05	CE 3105	Design of Steel Structures	3	3.00	C
06	CE 3106	Design of Steel Structures Sessional	3	1.50	C
07	CE 3301	Principles of Soil Mechanics	4	4.00	C
08	CE 3302	Geotechnical Engineering Laboratory	3/2	0.75	C
Total:			26.50	22.75	

7.6 Scheme of 3rd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	CE 3107	Analysis of Indeterminate Structures	4	4.00	C
02	CE 3108	Bridge Design Sessional	3	1.50	C
03	CE 3201	Hydrology	3	3.00	C
04	CE 3303	Foundation Engineering	3	3.00	C
05	CE 3304	Foundation Engineering Sessional	3/2	0.75	C
06	CE 3401	Environmental Engineering I	4	4.00	C
07	CE 3402	Environmental Engineering I	3/2	0.75	C

		Sessional			
08	CE 3501	Transportation Planning and Traffic Engineering	3	3.00	C
09	CE 3502	Traffic Engineering Sessional	3/2	0.75	C
Total:			24.50	20.75	

7.7 Scheme of 4th Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	HSS 4101	Bangladesh Studies and Government	3	3.00	
02	CE 4000	Undergraduate Thesis	3	1.50*	C
03	CE 4002	Capstone Project	3	1.50*	C
04	CE 4003	Project Planning and Construction Management	3	3.00	C
05	CE 4102	Building Design Sessional	3	1.50	C
06	CE 4201	Irrigation and Flood Management	3	3.00	C
07	CE 4401	Environmental Engineering II	3	3.00	C
08	CE 4402	Environmental Engineering II Sessional	3/2	0.75	C
09	CE 4501	Pavement Design and Railway Engineering	4	4.00	C
10	CE 4502	Highway Materials Sessional	3/2	0.75	C
Total:			28.00	19.00	

7.8 Scheme of 4th Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hours/week	Credits	Remarks
01	CE 4000	Undergraduate Thesis	3	3.00**	C
02	CE 4002	Capstone Project	6	4.50**	C
03	CE 4005	Sustainability of Development Projects	3	3.00	C (Select One)

	CE 4007	Principles of Project Finance	3	3.00	
	CE 4009	Business and Career Development	3	3.00	
04	CE 4011	Professional Practice, Communication and Ethics	3	3.00	C
05	CE 4012	Professional Practice and Communication Sessional	3	1.50	C
06		Optional Course I	2	2.00	O
07		Optional Course II	2	2.00	O
08		Optional Course III	2	2.00	O
Total:			24.00	21.00	

7.9 List of Optional Courses (O)

Division	Course No.	Course Title	Contact hrs/week	Credits	Remarks
Structural Engineering	CE 4103	Prestressed Concrete	2	2.00	O
	CE 4105	Introduction to Steel-Concrete Composite Structures	2	2.00	O
	CE 4107	Design of Concrete Structures III	2	2.00	O
	CE 4109	Introduction to Finite Element Method	2	2.00	O
	CE 4111	Structural Dynamics	2	2.00	O
Water Resources Engineering	CE 4203	Hydraulic Structures	2	2.00	O
	CE 4205	River Engineering	2	2.00	O
	CE 4207	Coastal Engineering	2	2.00	O
Geotechnical Engineering	CE 4301	Earth Retaining Structures	2	2.00	O
	CE 4303	Elementary Soil Dynamics	2	2.00	O
	CE 4305	Earth Dams and Stability of Slope	2	2.00	O
Environmental Engineering	CE 4403	Solid Waste Management	2	2.00	O
	CE 4405	Environment Pollution Management	2	2.00	O
	CE 4407	Environmental Impact Assessment	2	2.00	O
Transportation Engineering	CE 4503	Traffic Engineering Design and Management	2	2.00	O

Division	Course No.	Course Title	Contact hrs/week	Credits	Remarks
	CE 4505	Pavement Management, Drainage and Airport	2	2.00	O
	CE 4507	Urban Transportation Planning and Management	2	2.00	O

7.10 Course Distribution

⊕ LANGUAGE AND GENERAL EDUCATION

	Course No.	Course Title	Credit
Language and General Education	HSS 1101	Accounting and Sociology	3.00
	HSS 1103	English and Economics	4.00
	HSS 1104	English Sessional	0.75
	HSS 2102	English Language Skill Development	1.50
	HSS 4101	Bangladesh Studies and Government	3.00
	CE 4005	Sustainability of Development Projects	3.00
	CE 4007	Principles of Project Finance	
	CE 4009	Business and Career Development	
Total			15.25

⊕ BASIC SCIENCES AND MATHEMATICS

	Course No.	Course Title	Credit
Basic Science	Phy 1101	Heat, Properties of Matter, Waves, Electricity and Magnetism	3.00
	Phy 1102	Properties of Matter, Heat and Electricity Sessional	0.75
	Ch 1101	Chemistry	4.00
	Ch 1102	Chemistry Sessional	0.75
	Phy 2101	Optics, Structure of Solid and Modern Physics	3.00
	Phy 2102	Waves, Oscillations, Optics and Magnetism Sessional	0.75
Mathematics	Math 1101	Differential and Integral Calculus	3.00
	Math 2101	Differential Equations and Laplace Transform	4.00
	Math 2103	Matrices, Fourier Series and Vector Analysis	3.00
	Math 3101	Numerical Methods and Statistics	4.00
Total			26.25

⊕ **OTHER ENGINEERING**

	Course No.	Course Title	Credit
Electrical Engineering	EEE 1101	Basic Electrical Technology	3.00
Computer Science and Engineering	CE 1008	Computer Aided Drafting	0.75
	CE 2012	Computer Programming Sessional	1.50
	CE 3002	Engineering Computation Sessional	1.50
Mechanical Engineering	CE 1010	Welding and Carpentry Shop	0.75
Architecture and Mechanical Engineering	CE 2014	Architectural, Engineering and Planning Appreciation	1.50
Total			9.00

⊕ **CORE COURSES**

	Course No.	Course Title	Credit
Basic Engineering	CE 1001	Surveying	3.00
	CE 1002	Surveying Sessional	0.75
	CE 1003	Engineering Materials I	2.00
	CE 1005	Details of Construction	2.00
	CE 1006	Quantity Survey	1.50
	CE 1000	Civil Engineering Drawing	0.75
	CE 1011	Analytic Mechanics	3.00
	CE 2001	Engineering Materials II	3.00
	CE 2002	Engineering Materials II Sessional	1.50
	CE 2003	Mechanics of Solids I	3.00
	CE 2005	Fluid Mechanics	3.00
	CE 2006	Fluid Mechanics Sessional	1.50
	CE 2007	Engineering Geology and Geomorphology	3.00
	CE 2009	Mechanics of Solids II	3.00
	CE 2010	Mechanics of Solids Sessional	1.50
	CE 2016	Detailing of Reinforced Concrete Structures	0.75
Structural Engineering	CE 2101	Design of Concrete Structures I	3.00
	CE 3101	Structural Analysis	4.00
	CE 3105	Design of Steel Structures	3.00
	CE 3106	Design of Steel Structures Sessional	1.50
	CE 3107	Analysis of Indeterminate Structures	4.00
	CE 3103	Design of Concrete Structures II	4.00

	CE 3108	Bridge Design Sessional	1.50
	CE 4102	Building Design Sessional	1.50
Water Resources Engineering	CE 2201	Open Channel Flow	3.00
	CE 2202	Open Channel Flow Sessional	0.75
	CE 3201	Hydrology	3.00
	CE 4201	Irrigation and Flood Management	3.00
Geotechnical Engineering	CE 3301	Principles of Soil Mechanics	4.00
	CE 3302	Geotechnical Engineering Laboratory	0.75
	CE 3303	Foundation Engineering	3.00
	CE 3304	Foundation Engineering Sessional	0.75
Environmental Engineering	CE 3401	Environmental Engineering I	4.00
	CE 3402	Environmental Engineering I Sessional	0.75
	CE 4401	Environmental Engineering II	3.00
	CE 4402	Environmental Engineering II Sessional	0.75
Transportation Engineering	CE 3501	Transportation Planning and Traffic Engineering	3.00
	CE 3502	Traffic Engineering Sessional	0.75
	CE 4501	Pavement Design and Railway Engineering	4.00
	CE 4502	Highway Materials Sessional	0.75
Total			91.00

⊕ **ENGINEERING PRACTICE**

	Course No.	Course Title	Credit
Civil Engineering Practice	CE 4011	Professional Practice and Ethics	3.00
	CE 4012	Professional Practice and Communication Sessional	1.50
	CE 4003	Project Planning and Construction Management	3.00
Total			7.50

⊕ **PROJECT AND THESIS**

	Course No.	Course Title	Credit
Project and Thesis	CE 4000	Undergraduate Thesis	3.00
	CE 4002	Capstone Project	4.50
Total			7.50

⊕ **TECHNICAL ELECTIVES**

Division	Course No.	Course Title	Contact hrs/week	Credits	Remarks
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Division	Course No.	Course Title	Contact hrs/week	Credits	Remarks
Structural Engineering	CE 4103	Prestressed Concrete	2	2.00	O
	CE 4105	Introduction to Steel-Concrete Composite Structures	2	2.00	O
	CE 4107	Design of Concrete Structures III	2	2.00	O
	CE 4109	Introduction to Finite Element Method	2	2.00	O
	CE 4111	Structural Dynamics	2	2.00	O
Water Resources Engineering	CE 4203	Hydraulic Structures	2	2.00	O
	CE 4205	River Engineering	2	2.00	O
	CE 4207	Coastal Engineering	2	2.00	O
Geotechnical Engineering	CE 4301	Earth Retaining Structures	2	2.00	O
	CE 4303	Elementary Soil Dynamics	2	2.00	O
	CE 4305	Earth Dams and Stability of Slope	2	2.00	O
Environmental Engineering	CE 4403	Solid Waste Management	2	2.00	O
	CE 4405	Environment Pollution Management	2	2.00	O
	CE 4407	Environmental Impact Assessment	2	2.00	O
Transportation Engineering	CE 4503	Traffic Engineering Design and Management	2	2.00	O
	CE 4505	Pavement Management, Drainage and Airport	2	2.00	O
	CE 4507	Urban Transportation Planning and Management	2	2.00	O
				Total	6.00

PART C

8. Course Description

8.1. 1st Year 1st Semester (Exempted)

Note:

- (a) Courses of 1st year 1st semester are exempted because of the candidates' completion of a minimum four years Diploma in Engineering backgrounds after ten years of schooling. Moreover, the admission test syllabus also included basic engineering subjects, which usually covers in 4 years Diploma in Engineering program.
- (b) The complete outcome-based curriculum is not prepared for exempted courses. Due to exemption of 1st year 1st semester courses, course content, course learning outcome and program outcomes are documented for these courses.

8.1.1. HSS 1101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: HSS 1101 COURSE TITLE: Accounting and Sociology		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: N/A	SEE Marks: N/A

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the concept of bookkeeping and accounting.
CLO2	Prepare and preserve accounting information related to business and development projects.
CLO3	Understand the basic concepts and theories of sociology and explain the role and activities of public in the modernization and development of society.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1											√	
CLO2											√	
CLO3						√						

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Concept of bookkeeping and accounting;	3.0	CLO1
2	Transactions; Entry systems; Adjusting Entries, Worksheet; Accounts; Journal ledger;	10.0	CLO2
	Cashbook; Final account	7.0	CLO2

SN	COURSE CONTENT	Hrs	CLOs
4	Environment and human activities; climate change and global risk; population and urbanization, human in urban society	10.0	CLO3
5	Modernization and city development; rights and duties of citizen in society; social control and technology	9.0	CLO3

8.1.2. EEE 1101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: EEE 1101 COURSE TITLE: Basic Electrical Technology		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: N/A	SEE Marks: N/A

Course Learning Outcomes (CLOs): On successful completion of this course, students will be able to--

CLO1	Understand the electric circuit analysis methods and the working principles of transformer and induction motors and their performance evaluation.
CLO2	Analyze complex electrical networks using node and mesh analysis.
CLO3	Apply phasor algebra to solve sinusoidal single-phase and balanced three-phase circuits.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√	√										
CLO3	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Electrical units and standards	2.0	CLO1
2	Series and parallel electrical network	3.0	CLO1
3	Node analysis	3.0	CLO2
4	Mesh analysis	3.0	CLO2
5	Instantaneous current, voltage and power	2.0	CLO1
6	Effective current and voltage, average power	2.0	CLO1
7	Sinusoidal single-phase RLC circuits	4.0	CLO3
8	Phasor algebra	3.0	CLO3
9	Balanced three-phase circuits	4.0	CLO3

10	Introduction to transformers	3.0	CLO1
11	Induction motors	4.0	CLO1
12	Electrical wiring for residential loads	3.0	CLO2
13	Electrical wiring for commercial loads	3.0	CLO2

8.1.3. CE 1000

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1000 COURSE TITLE: Civil Engineering Drawing		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Explain the process of Lettering, numbering, and heading by hand on drawing.
CLO2	Create 2-dimensional and 3-dimensional drawings.
CLO3	Draw different types of solid geometric elements by hand.
CLO4	Draw plan, elevation, and section of multi-storied buildings, and plan and section of the septic tank (Create).

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√	√										
CLO3	√	√										
CLO4	√		√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to lettering, numbering, and heading	3.0	CLO1
2	Draw plane geometric shape of pentagon, hexagon, octagon, ellipse, parabola, and hyperbola	3.0	CLO1, CLO2
3	Draw projection of triangular, square, pentagonal, and hexagonal prisms	3.0	CLO1, CLO2
4	Draw projection of cube, cone, and cylinder	3.0	CLO1, CLO2
5	Development of cube, pyramid, cone, and prism	3.0	CLO1, CLO2
6	Draw section and true shape of cube, pyramid, cone, and prism	3.0	CLO1, CLO2
7	Development of isometric drawing and interpretation of solids	3.0	CLO2, CLO3

SN	COURSE CONTENT	Hrs	CLOs
8	Draw plan of multi-storied buildings	3.0	CLO1, CLO4
9	Draw elevation of multi-storied buildings	3.0	CLO1, CLO4
10	Draw section of multi-storied buildings	3.0	CLO1, CLO4
11	Draw plan of septic tank	3.0	CLO1, CLO4
12	Draw section of septic tank	3.0	CLO1, CLO4

8.1.4. CE 1001

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1001 COURSE TITLE: Surveying		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: N/A	SEE Marks: N/A

Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to

CLO1	Understand engineering knowledge in conducting various surveys, including reconnaissance, traverse, and astronomical surveys.
CLO2	Understand and evaluate curves and curve ranging, transition curves, and vertical curves.
CLO3	Perform analysis on terrestrial photography, aerial photography, and remote sensing using geographic information system (GIS) and global positioning system (GPS).

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√				√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Reconnaissance survey; linear measurements; traverse survey;	4.0	CLO1
2	Triangulation, leveling and contouring; calculation of areas and volumes;	4.0	CLO1
3	Problems on heights and distances; curves and curve ranging, transition curve, vertical curves	3.0	CLO2
4	Tacheometry: introduction, principles and problems on tacheometry;	5.0	CLO1
5	Astronomical surveying: definition, instruments, astronomical corrections, systems of time;	5.0	CLO1
6	Photogrammetry: introduction of terrestrial	5.0	CLO3

SN	COURSE CONTENT	Hrs	CLOs
	photography, aerial photography, reading of photo mosaic, scale		
7	Project surveying; errors in surveying; remote sensing	5.0	CLO1
8	Introduction and application of geographic information system (GIS) and global positioning system (GPS).	8.0	CLO3

8.1.5. CE 1002

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1002 COURSE TITLE: Surveying Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Use the surveying equipments to conduct a field survey.
CLO2	Perform chain survey, traverse survey, tacheometry survey, total station survey, hydrographic survey.
CLO3	Conduct leveling, setting a layout of a building.
CLO4	Comprehend and prepare useful reports, prepare documentation, make effective presentations, give and receive clear instructions.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√				√							
CLO2	√	√										
CLO3	√	√										
CLO4					√					√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Linear and angular measurement techniques; traverse surveying	3.0	CLO1, CLO2
2	Leveling and contouring; route project	3.0	CLO1, CLO2, CLO3
3	House setting	3.0	CLO1, CLO3
4	Curve setting and tacheometry	3.0	CLO1, CLO2
5	Project surveying	3.0	CLO1, CLO2
6	Plotting area using GPS and total station survey	3.0	CLO1, CLO2
7	Modern surveying equipment and their applications.	1.5	CLO1, CLO2

8.1.6. CE 1003

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1003 COURSE TITLE: Engineering Materials I		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: N/A	SEE Marks: N/A

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Recognize the properties of various civil engineering materials, including brick, aggregate, sand, cement, lime, paint, plywood, plastic-wood, and timber.
CLO2	Understand the differences between cement and lime considering manufacturing process, types, and composition.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√											

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction and importance of Engineering materials; Bricks: Constituents, manufacture, characteristics, classification and use of bricks; types of bricks	2.0	CLO1
2	Sand cement block, ceramic products, different types of tiles	2.0	CLO1
3	Aggregate: classification and properties of aggregate; classification, properties, and function of sand;	3.0	CLO1
4	Cement and lime: difference between cement and lime; manufacture, types and composition of cement;	3.0	CLO2
5	Mortar and plaster: types, uses and preparation of mortar; special mortars; Plastering; Pointing.	2.0	CLO1
6	Paints and varnishes: white and color washing; distempering; plastic and cement paint; water repellent paints; epoxy coating;	3.0	CLO2
7	Concrete: function of aggregate and water in concrete; segregation; bleeding; properties of concrete;	3.0	CLO1
8	Strength and workability of concrete; introduction to plywood, plastic wood and their properties; properties and uses of timber.	6.0	CLO1

8.1.7. CE 1005

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1005 COURSE TITLE: Details of Construction		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: N/A	SEE Marks: N/A

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Identify different types of civil engineering structures and their components.
CLO2	Recognize the construction procedure of different civil engineering works.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to different types of buildings and bridges; components of different types of buildings: frame structure, brick masonry structures and their construction;	5.0	CLO1, CLO2
2	site exploration, bearing capacity of soil; excavation and related protection for constructing foundation safely: shoring and underpinning; shallow foundation and deep foundation;	5.0	CLO1, CLO2
3	brick masonry: types of brick, bonds in brickwork, supervision of brickwork, brick laying tools, defects and strength on brick masonry; load bearing and non-load bearing walls, cavity walls, partition walls;	5.0	CLO1, CLO2
4	reinforced cement concrete construction: lintels, arches, stairs and floors slab: edge supported slab and column supported slab;	5.0	CLO1, CLO2
5	scaffolding and formwork; plastering, pointing, painting; distempering and whitewashing; sound insulation: acoustics; thermal insulation; house plumbing: water supply and wastewater drainage;	6.0	CLO1, CLO2

8.1.8 CE 1006

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1006
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COURSE TITLE: Quantity Surveying		
CREDIT: 1.50 (Sessional)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Interpret valuations, cost estimation and construction layout information
CLO2	Calculate the quantity of materials and labor, and cost of construction during the pre-contract stage of the construction process.
CLO3	Select appropriate cost assistance and cost organizing strategies and techniques to enable building work to be designed within agreed expenditure limits.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√	√									
CLO3		√			√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Estimation of earthwork from spot level	3.0	CLO1
2	Material quantity and cost estimation for building component: slab	4.0	CLO1, CLO2
3	Material quantity and cost estimation for building component: beam	4.0	CLO1, CLO2
4	Material quantity and cost estimation for building component: column and footing	4.0	CLO2, CLO3
5	Material quantity and cost estimation for building component: lintels and brickworks	4.0	CLO2, CLO3
6	Analysis of rates and specifications	4.0	CLO2, CLO3
7	Estimation and costing of a septic tank	4.0	CLO2, CLO3
8	Estimation and costing of an underground reservoir	4.0	CLO2, CLO3
9	Estimation and costing of retaining wall, culvert and bridges	4.0	CLO2, CLO3
10	Estimation and costing of steel trusses	4.0	CLO2, CLO3

8.1.9 CE 1008

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1008 COURSE TITLE: Computer Aided Drafting		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: NA	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to

CLO1	Use computer and modern engineering software for civil engineering drawing.
CLO2	Draw plan and elevation of different civil engineering structures.
CLO3	Prepare sectional drawing of civil engineering structural elements with reinforcement detailing.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√				√							
CLO2	√				√							
CLO3				√	√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to computer usage	1.5	CLO1
2	Introduction to CAD packages and computer-aided drafting: drawing, editing and dimensioning of simple objects	4.5	CLO1, CLO2
3	Plan, elevations, sections of multi-storied buildings	4.5	CLO1, CLO2
4	Section of reinforced concrete beams, columns, slabs, stairs, roof trusses and plan and section of a septic tank	3.0	CLO2, CLO3
5	Plan, elevations and sections of culverts, bridges and other hydraulic structures	3.0	CLO2, CLO3
6	Drawings of building services	1.5	CLO2, CLO3

8.1.10 CE 1010

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1010 COURSE TITLE: Welding, Carpentry and Machine Shop Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 1 st Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to

CLO1	Identify various tools used in welding, carpentry, and machine shops.
CLO2	Describe different types of joints in metal and wood.
CLO3	Apply arc and gas welding in practical engineering works.
CLO4	Identify defects in materials and their recovery process.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√				√							
CLO2	√	√										
CLO3	√					√						
CLO4	√			√								

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Methods of metal joints: Riveting, grooving soldering, welding; Types of welding joints and welding practice;	3.0	CLO1, CLO2
2	Position of arc welding and polarity: flat, vertical, horizontal, overhead; Electric Arc welding and its machineries;	6.0	CLO1, CLO3
3	Welding of different types of materials: Low carbon steel, cast iron, brass, copper, stainless steel, aluminum; Types of electrode, fluxes and their composition; Arc welding defects;	3.0	CLO1, CLO2, CLO3, CLO4
4	Test of Arc welding: Visual, destructive and non-destructive tests	6.0	CLO1, CLO2, CLO3
5	Types of gas welding system and gas welding equipment; Gases and types of flame; welding of different types of materials; Gas welding defects; test of gas welding	6.0	CLO1, CLO2, CLO3
6	Kinds of tools; common bench and hand tools; marking and layout tools, measuring tools, cutting tools, machine tools, bench work with job; drilling, shaper,	3.0	CLO1, CLO2
7	Lathe and milling machines: introduction, type, size and capacity, uses and applications.	3.0	CLO1, CLO2
8	Wood working tools; wood working machine: band saw, scroll saw, circular saw, jointer, thickness planer, disc sander, wood lathe; types of sawing; common cuts in wood works; types of joint;	3.0	CLO1, CLO2, CLO4
9	Defects of timber: natural defects and artificial defects; seasoning; preservation;	3.0	CLO1, CLO2, CLO4
10	Substitute of timber; commercial forms of timber; characteristics of good timber; use of fastening;	3.0	CLO1, CLO2, CLO4

8.2. 1st Year 2nd Semester

8.2.1. Math 1101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Math 1101 COURSE TITLE: Differential and Integral Calculus		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 1 st Year 2 nd Semester	
Exam Hours: 3.0	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand maxima and minima and explain the extreme values of a function to solve the indeterminate forms.
CLO2	Calculate the directions of velocity and acceleration of a moving object.
CLO3	Implement the procedure for integrating rational functions to solve different integration problems using Gamma and Beta function.
CLO4	Apply the concept of integration to evaluate the geometric area and solve other applied mathematics problems.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3		√										
CLO4		√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Limit; Continuity and differentiability;	3.0	CLO1
2	n-th derivatives of standard function; Leibnit'z theorem;	4.0	CLO1, CLO2
3	Rolle's theorem; Mean value theorem, Tangent and normal;	3.0	CLO1
4	Indeterminate form; Maxima and minima;	4.0	CLO1, CLO2
5	Subtangent and subnormal; Partial differentiation;	3.0	CLO3
6	Euler's theorem; Curvature;	4.0	CLO3
7	Integration by parts; Standard integrals;	3.0	CLO4
8	Integration by the method of successive, reduction;	4.0	CLO4
9	Definite integrals: Improper integrals;	4.0	CLO4
10	Beta and Gamma functions;	4.0	CLO4
11	Area, volume of solids of revolution	3.0	CLO4

TEXTBOOK:

1. Chakraborty Integral and Differential Calculus, Das and Mukherjee, 52nd edition.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Calculus, Howard Anton, 10th Edition, JOHN WILEY & SONS, INC., 2012.
2. Integral and Differential Calculus (Part 1 & 2), Abdul Matin and Bidhubhushan, Standard Publication. 5th Edition.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	30
Apply	60
Analyze	-
Evaluate	-

8.2.2. Phy 1101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Phy 1101 COURSE TITLE: Heat, Properties of Matter, Waves, Electricity and Magnetism		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 1 st Year 2 nd semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the essential thermal and physical properties of matter to determine the relevant properties
CLO2	Distinguish between different phenomena associated with waves to identify the basic requirements of a big hall with the least possible noise.
CLO3	Relate the concepts of electricity and magnetism to determine electric field, electric potential, magnetic field, torque, curie temperature, etc.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Heat: Equation of state, Kinetic theory of gases, Kinetic calculation of pressure, Ratio of specific heats, Mean free path; Van der Waal's equation of state, Critical constants, Van der Waals constant; Thermal Conductivity, Accretion of ice on ponds.	9.0	CLO1
2	Thermodynamics: Thermodynamic processes, First law and Zeroth law of thermodynamics and its application; Isothermal and adiabatic gas equation and work done, Reversible and irreversible processes, Second law of thermodynamics, The Carnot cycle; Entropy of a perfect gas.	9.0	CLO1
3	Gravitation: Kepler's laws of planetary motion, Gravitational potential and field due to spherical shell and solid sphere, Escape velocity, Velocity of a satellite. Elasticity: Stress and Strain, Elastic constants, Relation between elastic constants, Bending of a beam. Surface Tension: Molecular theory of surface tension, Surface energy, Excess pressure of curved surface, Capillarity, Surface tension of water by capillary rise method. Fluid Motion and Viscosity: Equation of continuity, Bernoulli's equation, Viscosity, Poiseuille's equation, Coefficient of viscosity, Stoke's law.	9.0	CLO1
4	Wave Motion: Types of wave motion, Expression for plane progressive wave, Energy of stationary and progressive wave. Acoustics: Interference, Beats, Doppler Effect, Reverberation, Sabine's reverberation formula and problem involving building acoustics. Oscillations: Simple harmonic motion and its energy calculation, Lissajou's figures; Damped harmonic motion and its solutions for different damping; Forced oscillation and resonance.	6.0	CLO2
	Electricity: Coulomb's law, Electric field, Gauss' law, Electric potential and their applications due to continuous charge distribution and electric dipole; Capacitance and capacitor,	6.0	CLO3

	Capacitor with a dielectric, Gauss' law with dielectrics. Magnetism: Magnetic force on a current carrying conductor, Lorentz force, Biot-Savart law and Ampere's law and their applications; Induction and inductance, Faraday's law, Lenz's law, self induction and mutual induction; Different types of magnetism, Three magnetic vectors, Hysteresis.		
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TEXTBOOKS:

1. Physics for Engineers-1 and 2 - Dr. Gias Uddin Ahmad
2. Heat & Thermodynamics, Subrahmanyam and Brijlal, S.Chand & Company, 2002.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time)

1. Physics for Engineers-1 and 2 - Dr. Gias Uddin Ahmad
2. Physics I & II, Halliday, Resnick, Krane, 5th edition, Willy
3. Properties of Matter, Subrahmanyam and Brijlal, S.Chand & Company, 1970.
4. Electricity & Magnetism, K. K. Tewari, S. Chand Publishing, 1995

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (Marks 210) (%)
Remember	20
Understand	30
Apply	40
Analyze	-
Evaluate	10

8.2.3. Phy 1102

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Phy 1102 COURSE TITLE: Properties of Matter, Heat and Electricity Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 1 st Year 2 nd semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Conduct laboratory tests on properties of matter, heat, and electricity.
CLO2	Explain an engineering material (solid or liquid) by evaluating its physical property.
CLO3	Comprehend and write effective laboratory reports; communicate through proper documentation and presentations.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√	√										
CLO3									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Determination of specific heat of a liquid by the method of cooling;	2.0	CLO1, CLO2, CLO3
2	Determination of specific heat of a solid by the method of mixture;	1.5	CLO1, CLO2, CLO3
3	Determination of thermal conductivity of copper by Searle's apparatus;	1.5	CLO1, CLO2, CLO3
4	Determination of thermal conductivity of a bad conductor by Lee's method;	1.5	CLO1, CLO2, CLO3
5	Determination of the electrochemical equivalent of copper using copper voltameter;	1.5	CLO1, CLO2, CLO3
6	Determination of the value of unknown resistance and verify the laws of series and parallel resistances utilizing a P.O. box;	1.5	CLO1, CLO2, CLO3
7	Determination of the specific resistance of a given wire by meter bridge;	1.5	CLO1, CLO2, CLO3
8	Determination of Young's modulus of a short wire by Searle's method;	1.5	CLO1, CLO2, CLO3
9	Determination of surface tension of water by capillary tube method;	1.5	CLO1, CLO2, CLO3
10	Determination of the viscosity of water by its rate of flow through a capillary tube;	1.5	CLO1, CLO2, CLO3
11	Comparison of the E.M.F. of two cells with	1.5	CLO1, CLO2,

SN	Course Content/Topic	Hrs	CLOs
	potentiometer;		CLO3
12	Determination of the mechanical equivalent of heat (J) by electrical method.	1.5	CLO1, CLO2, CLO3

TEXTBOOK:

1. Practical Physics, Dr. Giasuddin Ahmed. 4th Edition.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. A Textbook of Practical Physics, William Watson, Kessinger Publishing, LLC, 2008.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (50 Marks) (%)	Lab Quiz (40 Marks) (%)	In class Participation (10 Marks) (%)
Remember	30	30	50
Understand	40	40	50
Apply	30	30	
Analyze			
Evaluate			
Create			

8.2.4. Ch 1101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Ch 1101 COURSE TITLE: Chemistry		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 1 st Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the shapes of molecules and ions using relevant theories of bond formation; recognize different types of solutions and colloids
CLO2	Comprehend the properties of polymer, cement, and corrosion in Civil engineering applications
CLO3	Apply the principles of equilibrium to chemical systems using LeChatelier's Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CLO1	√	√										
CLO2	√	√										
CLO3	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Quantum numbers and Different principles of electronic distribution in atoms	8.0	CLO1
2	Chemical bond: different types of chemical bonds, molecular structure	8.0	CLO1
3	Polymer chemistry and Cement	6.0	CLO2
4	Solutions, Colligative properties, pH and buffer solutions	6.0	CLO1
5	Colloids and its classifications	4.0	CLO1
6	Thermochemistry and Chemical kinetics	8.0	CLO3
7	Chemical equilibrium	6.0	CLO3
8	Corrosion and its prevention	6.0	CLO2

TEXTBOOK:

1. Essential of Physical Chemistry, A. Bahl; B. S. Tuli; G. D. Tuli, 6th Edition.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Chemistry, R. Chang, 10th Edition.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	Class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	40
Understand	30
Apply	30
Analyze	
Evaluate	

8.2.5. Ch 1102

DEGREE PROGRAM: B.Sc. in Civil Engineering

COURSE CODE: Ch 1102 COURSE TITLE: Chemistry Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 1 st Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs) On successful completion of this course, the student will be able to-

CLO1	Apply the theoretical knowledge and laboratory skills to design, safely conduct and interpret chemical reactions.
CLO2	Conduct chemical tests and evaluate the obtained results with the standards and target results.
CLO3	Comprehend and write laboratory test reports, communicate through proper documentation and presentations.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√										
CLO3									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Proper instructions about fundamental safety rules and basic laboratory skills and instruments	2.0	CLO1
2	Determination of the strength of supplied HCl solution; with standard Na ₂ CO ₃ solution	2.0	CLO2, CLO3
3	Determination of the strength of supplied KMnO ₄ solution using standard Sodium Oxalate solution	3.0	CLO2, CLO3
4	Kinetic studies of the reaction between thiosulphate ions and hydrogen ions in an aqueous solution	3.0	CLO2, CLO3
5	Determination of strength of given Na ₂ S ₂ O ₃ solution with standard KMnO ₄ solution (Iodometrically)	3.0	CLO2, CLO3
6	Estimation of Fe ²⁺ content in a given solution of Mohr's salt (ferrous ammonium sulfate) using standard KMnO ₄ solution	3.0	CLO2, CLO3
7	Estimation of Cu ²⁺ contained in a supplied solution by iodometric method	3.0	CLO2, CLO3

TEXTBOOK:

1. Essential of Physical Chemistry, A. Bahl; B. S. Tuli; G. D. Tuli, 6th Edition.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Vogel's Textbook of Quantitative Chemical Analysis, G. H. Jeffery, J. Bassett, J. Mendham, R. C. Denney, 5th Edition,

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation (Marks: 100)

Bloom's Category	Assignment (Class and Home) / Report (50 Marks) (%)	Quiz (40 Marks) (%)	In class Participation (10 Marks) (%)
Remember	30	30	50
Understand	40	40	50
Apply	30	30	
Analyze			
Evaluate			

8.2.6. HSS 1103

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: HSS 1103 COURSE TITLE: English and Economics		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 1 st Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the features of the target language to meet various communication needs.
CLO2	Communicate with others in a professional manner with ethical responsibility.
CLO3	Understand the fundamental concepts economics aligned with engineering in professional services.
CLO4	Analyze the contemporary economic and financial situation across the industrial profession, evaluate engineering project proposals and offer potential solutions.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1										√		
CLO2										√		
CLO3											√	
CLO4											√	

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	IPA symbols (vowel and Consonant), dictionary reading and pronunciation skills using RP (pronunciation),	2.0	CLO1, CLO2

SN	COURSE CONTENT	Hrs	CLOs
	Phonemic Transcription and pronunciation drills		
2	Functions of word classes, Word formation processes, Professional terminologies, British vs American English	2.0	CLO1, CLO2
3	Effective Reading Strategies; Skimming, Scanning, Predicting, Inferring, Extensive and Intensive Reading, synthesizing reading into writing	2.0	CLO1, CLO2
4	Types and Mechanics of writing paragraph, Cohesion & coherence, academic essay: (Cause and Effect, Comparison-Contrast, Argumentative)	2.0	CLO1, CLO2
5	Business letters: i) Placing order ii) complaint letter iii) Adjustment letter, iv) Business/ project proposal writing, CV and Cover letter, E-mail writing	2.0	CLO1, CLO2
6	Types & functions of Clauses, Basic sentence patterns, Subject Verb Concord, correct usage of verbs	3.0	CLO1, CLO2
7	Academic writing: Referencing and citation with special focus on APA and IEEE, Critical/reflective writing: response paper, book/film review	3.0	CLO1, CLO2
8	Determiners & modifiers, misplaced and dangling modifiers; parallelism, fragments and run on, correction of errors	3.0	CLO1, CLO2
9	Technical Report, E-tender notice; amplification on field specific topics, Information Transfer	3.0	CLO1, CLO2
10	Verbal, usage of preposition; paraphrasing, abstract/executive summary, writing dialogue with & without clues, technical and scientific presentation.	2.0	CLO1, CLO2
11	Technical Report, E-tender notice; amplification on field specific topics, Information Transfer	2.0	CLO1, CLO2
12	Economics vs. engineering economics, opportunity cost, and marginal analysis. Production, factors of production, short- and long-run cost, marginal and average cost,	3.0	CLO3
13	Producer equilibrium: profit maximization, and cost minimization. Market structure aligned with engineering perspectives	4.0	CLO3
14	Demand and supply analysis, determinants of demand and supply, equilibrium under the perfectly competitive market.	4.0	CLO3, CLO4
15	Utility and preference, indifference curve analysis, budget line, consumer equilibrium: utility maximization, elasticity, and its application.	4.0	CLO3, CLO4
16	Time series analysis, stationary versus nonstationary series, methods for time series; engineering forecasting using time series methods	4.0	CLO3, CLO4
17	Cause and effect analysis, forecasting error; binary models: probit and logit, and their application in engineering; quantile analysis.	3.0	CLO3, CLO4

SN	COURSE CONTENT	Hrs	CLOs
18	Circular flow of income, measures of national income: GDP, GNP, NNP. Demand management policy, monetary policy: money supply and interest rate, inflation.	4.0	CLO3, CLO4

TEXTBOOK:

1. High School English Grammar and Composition by Wren and Martin
2. Principles of engineering economics with applications, A. N. Siddiquee, M. H. Abidi, Z. A. Khan and B. Kumar, 2nd edition, Cambridge University Press.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. College Writings with Readings, John Langan, Sixth Edition
2. High School English Grammar and Composition by Wren and Martin
3. Friend's Language by Prof Md. Ataul Haque, Prof Jahurul Isam, Dr. Binoy Barman
4. Professional English by Dr. Islam and Md. Hashanat
5. Learning English The Easy Way by Sadruddin Ahmed
6. Take-off: Technical English for Engineering Course Book with Audio CDs, David Morgan, Nicholas Regan, 2008.
7. English for Engineering Students
8. Oxford English for Electrical and Mechanical Engineering, H. Glendining and N. Glendining, 1995.
9. Engineering Economic Analysis, D. G. Newnan P.E., Jerome, P. Lavelle, P.E. Ted and G. Eschenbach, 12th edition, Oxford University Press.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	30
Understand	30
Apply	30
Analyze	10
Evaluate	-

8.2.7. HSS 1104

DEGREE PROGRAM: B.Sc. in Civil Engineering

COURSE CODE: HSS 1104 COURSE TITLE: English Language Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 1 st Year 2 nd Semester	
Exam Hours: NA	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the features of the target language to meet various professional and personal communication needs.
CLO2	Analyze the contextual texts and resources related to receptive language skills to practice oral and written communication.
CLO3	Develop fluent oral communication skills individually and in groups.
CLO4	Apply the concepts of basic linguistic commutation techniques to other related areas facilitating learning.
CLO5	Demonstrate various practical skills of the target language applying knowledge of the target language.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1									√	√		
CLO2									√	√		
CLO3									√	√		
CLO4									√	√		
CLO5									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Ice breaking with social English expressions, key words & phrases in natural conversations	2.0	CLO1, CLO3, CLO5
2	Mechanics of writing: planning, organizing, rearranging ideas: short composition, Macro and Micro skills of reading: understanding text types of tone and environment, skimming, scanning, prediction	3.0	CLO2, CLO5
3	Relevant audio texts to supply missing information, take notes, write the gist, talking about multiple subjects, telling stories	2.0	CLO2, CLO4, CLO5
4	Academic and general essays with cohesion and clarity, drawing inferences from text clues, text mapping, flow-charting; anaphora and cataphora.	2.0	CLO2, CLO4, CLO5
5	Mock interview, professional meetings, turns, hedges, making suggestions, asking for and giving instructions, apologizing	2.0	CLO2, CLO3
6	describing picture, objects, people using appropriate modifiers, Note taking, annotation, identifying main	2.0	CLO2

SN	COURSE CONTENT	Hrs	CLOs
	ideas, supporting details		
7	Public speaking focusing on stress and intonations, presentation practice, polite refusal, agreeing/disagreeing; dialogue between peers; responding to news reports, writing reviews	3.0	CLO3, CLO5
8	Reading and interpreting tables and bar charts, comprehension questions, official/formal writing; asking for and giving written instructions	3.0	CLO2, CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Take-off: Technical English for Engineering Course Book with Audio CDs, David Morgan, Nicholas Regan, 2008.
2. Phonetics and Phonology, Peter Roach.
3. Communicative English for Engineers and Professionals, Nitin Bhatnagar, Mamta Bhatnagar.
4. Learning English The Easy Way by Sadruddin Ahmed.
5. Headway Advanced Student's Book with CD and workbook, Oxford University Press- John & Liz Soars.
6. Longman Guide for Writers and Readers- Longman Guide for Writers and Readers- Chris M. Anson and Robert A. Schwegler.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	30	30	20	20
Understand	30	30	50	30
Apply	30	30	20	30
Analyze	10	10	10	20

8.2.8. CE 1011

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 1011 COURSE TITLE: Analytic Mechanics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 1 st year 2 nd semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand basic terminologies and theories of analytic mechanics.
CLO2	Calculate support reactions, member forces, and moment of rigid or moving bodies using free body diagrams.
CLO3	Analyze the practical engineering problems of statics and dynamics.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Coplanar and non-coplanar forces	3.0	CLO1, CLO2, CLO3
2	Parallel and non-parallel forces	3.0	CLO1, CLO2, CLO3
3	Analyses of two-dimensional frames and trusses	4.0	CLO1, CLO2, CLO3
4	Maximum and minimum forces	2.0	CLO1, CLO2, CLO3
5	Flexible chords	3.0	CLO1, CLO2, CLO3
6	Friction	4.0	CLO1, CLO2, CLO3
7	Centroids	3.0	CLO1, CLO2, CLO3
8	Moment of inertia of areas	2.0	CLO1, CLO2, CLO3
9	Moment of inertia of masses	2.0	CLO1, CLO2, CLO3
10	Plane motion	3.0	CLO1, CLO2, CLO3
11	Principles of work, power and energy	3.0	CLO1, CLO2, CLO3
12	Impulse and momentum	3.0	CLO1, CLO2, CLO3
13	Virtual work principle for rigid bodies	4.0	CLO1, CLO2, CLO3

TEXTBOOK:

1. Analytic Mechanics, Faires & Chambers, 3rd Edition.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Engineering Mechanics Statics & Dynamics, R.C. Hibbler, 15th Edition, 2015.
2. Vector Mechanics for Engineers (Statics & Dynamics), Beer & Johnson, 10th Edition.
3. Engineering Mechanics, Volume 1, Statics by Meriam, 5th Edition, 2002.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests: 20% (60 Marks) (%)	In class Participation: 10% (30 Marks) (%)
Remember	10	50
Understand	30	50
Apply	60	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam: 70% (Marks 210) (%)
Remember	10
Understand	30
Apply	40
Analyze	20
Evaluate	

8.3. 2nd Year 1st Semester

8.3.1. Math 2101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Math 2101 COURSE TITLE: Differential Equations, Laplace Transform and Harmonics		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: 3.0	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the properties of differential equations and Laplace transforms to formulate and solve complex engineering problems.
CLO2	Derive mathematical models of physical systems using differential equations.
CLO3	Solve initial and boundary value problems.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										

CLO2		√										
CLO3			√		√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Definition, formation of differential equations; Solution of first order differential equation by various methods; Introduction, Equations of the linear and non-linear first order; Introduction, Linear first order partial differential equations	4.0	CLO1, CLO2
2	Solution of first order differential equation by various methods; Linear first order partial differential equations	4.0	CLO1, CLO2
3	solutions of differential equations of first order and higher degree; Linear first order partial differential equations	4.0	CLO1, CLO2, CLO3
4	General solution of linear equation of second and higher orders with constant co-efficient; Non-linear first order partial differential equations	4.0	CLO1, CLO2, CLO3
5	General solution of linear equation of second and higher orders with constant co-efficient; Non-linear first order partial differential equations	4.0	CLO1, CLO2, CLO3
6	General solution of linear equation of second and higher orders with constant co-efficient; Standard forms of partial differential equations	4.0	CLO2, CLO3
7	Solution of Euler's homogeneous linear equations; linear equations of higher order-equations of the second order with constant co-efficient	4.0	CLO2, CLO3
8	Laplace transforms of some elementary functions; linear equations of higher order-equations of the second order with constant co-efficient	4.0	CLO1, CLO2, CLO3
9	sufficient conditions for existence of Laplace transforms; linear equations of higher order-equations of the second order with constant co-efficient	4.0	CLO1, CLO2, CLO3
10	Inverse Laplace transforms, Laplace transforms of derivatives; linear equations of higher order-equations of the second order with variable co-efficient	4.0	CLO1, CLO3
11	periodic function, some special theorems on Laplace transforms, partial fraction; Circular Harmonics	4.0	CLO1, CLO3
12	Solutions of differential equations by Laplace transforms; Cylindrical Harmonics	4.0	CLO2, CLO3
13	Solutions of differential equations by Laplace transforms; Spherical Harmonics	4.0	CLO2, CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Differential Equations, Shepley L. Ross, 3rd Edition, John Wily & Sons Inc., 2004.

2. Partial Differential Equations, Awal, Hafiz, Mydul, Haque, 8th Edition, Titas Publications, Dhaka, 2016.
3. Laplace Transformation, Murray R. Spiegel, Schaum's Outline Series, 2012.
4. Differential Equations with applications, Prof. Dr. Mustafa Kamal Chowdhury, 1st Edition, Dhaka, 2014.
5. Differential Equations, Kedar Nath Ram Nath, Revised Edition, Delhi, 2008.
6. Partial Differential Equations, M. D. Raisinghanian, S. Chand Publishing, 2013

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	30
Understand	30
Apply	40
Analyze	
Evaluate	

8.3.2. Phy 2101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Phy 2101 COURSE TITLE: Optics, Structure of Solid and Modern Physics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Determine refractive index, wavelength of monochromatic light, resolving and dispersive power of a grating, and differentiate between polarized and unpolarized light.
CLO2	Identify the basic requirements of a proper photo-metal and crystalline material without defect.
CLO3	Calculate different parameters related to the theory of relativity and radioactivity.

CLO4	Apply Heisenberg's uncertainty principle to verify the existence of various particles inside the nucleus and Schrodinger equation for a particle inside a box.
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Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2		√										
CLO3	√		√									
CLO4	√		√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Interference: Huygen's principle, Young's experiment, Coherent sources,	3.0	CLO1, CLO3
2	Relativity: Postulates of special theory of relativity, Galilean and Lorentz transformation equations, analytical treatment of Interference, Interference due to thin films, Newton's rings. Length contraction, Time dilation, Twin paradox;	3.0	CLO1, CLO3
3	Diffraction: Fraunhofer diffraction, Fresnel diffraction concept of half period zone, Variation of mass with velocity, Einstein mass energy relation, Fraunhofer diffraction by single and double slit,	3.0	CLO1, CLO3
4	Particle properties of wave: Quantum theory of light, Photoelectric effect,	3.0	CLO1, CLO2
5	Plane diffraction grating, Resolving and dispersive power of a grating. Compton effect, Pair production,	3.0	CLO1, CLO2
6	Polarization: Polarization by reflection, refraction and double refraction, X-rays diffraction, Photons and gravity, Gravitational red shift; Brewster's law and Malus law, Elliptical and circular polarization of light, Nicol prism,	3.0	CLO1, CLO2
7	Wave properties of particle: Concept of de-Broglie wave, Phase velocity and group velocity, Heisenberg's uncertainty principle and its application;	3.0	CLO1, CLO4
8	Structure of Solids: Classification of solids: Crystalline, amorphous, ceramics and polymer, Schrodinger's equation, Particle in a box;	3.0	CLO2, CLO4
9	Different types of bonds in crystal and cohesive energy; Crystal structure: Different types of crystal structure,	3.0	CLO2, CLO3
10	Atomic Structure: Atom models, Electron orbits; Simple cubic, Body centered cubic and Face centered cubic crystal structure Energy levels and spectral series of hydrogen atom, Bohr's correspondence principle; Packing fraction, Miller indices and crystal plane; Defects in solids;	3.0	CLO2, CLO3
11	Nuclear structure and decay: Nuclear compositions, Mass defect, Binding energy, Radioactive decay, Laws of radioactive	3.0	CLO2, CLO3

SN	Course Content/Topic	Hrs	CLOs
	decay;		
12	Band theory of solids. Half-life and mean life, Radioactive series, Nuclear fission and fusion, Q-value of nuclear reaction.	3.0	CLO2, CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Physics for Engineers-1 and 2 - Dr. Gias Uddin Ahmad.
2. Physics I & II – Halliday, Resnick, Krane. 5th edition, Willy
3. Concepts of Modern Physics, Arthur Beiser, 3rd edition, 1994.
4. A text book of Optics, Subrahmanyam and Brijlal, S. Chand Publishing, 2012
5. Modern Physics – R. Murugesan.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	40
Apply	40
Analyze	-
Evaluate	-

8.3.3. Phy 2102

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Phy 2102 COURSE TITLE: Waves, Oscillations, Optics and Magnetism Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform laboratory tests on properties of Waves, Oscillations, Optics and Magnetism (Apply and Evaluate).
CLO2	Explain an engineering material (solid or liquid) by evaluating its physical properties (Evaluate).
CLO3	Comprehend and write useful reports, communicate through proper documentation and presentations (Understand and Apply).

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√	√										
CLO3									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Determination of the refractive index	1.5	CLO1, CLO2, CLO3
2	The radius of curvature of plano-convex lens	3.0	CLO1, CLO2, CLO3
3	Wavelength of sodium light	1.5	CLO1, CLO2, CLO3
4	Resolving power of a plane diffraction grating	1.5	CLO1, CLO2, CLO3
5	The specific rotation of a sugar solution	1.5	CLO1, CLO2, CLO3
6	Threshold frequency for the photoelectric effect of a photocathode and the value of the Planck's constant	3.0	CLO1, CLO2, CLO3
7	Temperature coefficient of the resistance of the material of a wire	1.5	CLO1, CLO2, CLO3
8	Ratio of horizontal component of the earth's magnetic field (H) and the magnetic moment (M) of a magnet	1.5	CLO1, CLO2, CLO3
9	Verification of the laws of transverse vibration of a string and determination of the frequency of a tuning fork by Melde's experiment.	3.0	CLO1, CLO2, CLO3
10	Value of acceleration due to gravity	1.5	CLO1, CLO2, CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Practical Physics, Dr. Giasuddin Ahmed. 4th edition.

2. A Textbook of Practical Physics, William Watson, Kessinger Publishing, LLC, 2008.
3. Supplied laboratory Manuals.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation (Marks: 100)

Bloom's Category	Assignment (Class and Home) / Report (50 Marks) (%)	Lab Quiz (40 Marks) (%)		In class Participation (10 Marks) (%)
Remember	40	30		50
Understand	40	35		50
Apply	20	35		
Analyze				
Evaluate				

8.3.4. HSS 2102

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: HSS 2102 COURSE TITLE: English Language Skill Development Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand and use English expressions in a range of real-life interaction skills.
CLO2	Analyze contextual critical reading material; store, formulate information, and use creative and analytical language to identify and clarify issues; solve problems in their core courses in written form.
CLO3	Demonstrate conversational skills with reasonable fluency on familiar concrete topics at a descriptive level and present a detailed critical analysis or comparison in ways that will help lifelong learning and in their careers both individually and as part of a team.
CLO4	Apply advanced discourse markers to identify notable information while listening to thematic and structural components of transcriptions and conversation.
CLO5	Develop communicative competence in both academic and professional environments and interpret data through the target language.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1									√	√		

CLO2									√	√		
CLO3									√	√		
CLO4									√	√		
CLO5									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Listening Skills: Listening to: Authentic audio texts for multiple academic and general listening activities on both local and global issues	3.0	CLO1, CLO3, CLO4
2	Speaking Skills: formal and informal speaking; simulating professional interview; practicing Received Pronunciation (RP); Group Discussion (GD) and debate; polite dis/agreement; extempore speech, dynamics of public speaking; professional presentation.	3.0	CLO2, CLO5
3	Reading Skills: Reading general and academic texts for multiple purposes; Critical reviews; paraphrasing and summarizing; note-taking; comprehension Q/A, matching tables and paragraph headings, identifying cohesive ties.	3.0	CLO1, CLO3, CLO4, CLO5
4	Writing Skills: Applying different approaches to writing in different sub-genres of paragraphs, Essays, reports; writing styles and mechanics; professional correspondence; Press release; Writing Statement of Purpose (SOP), writing proposal; Information transfer	3.0	CLO1, CLO2, CLO5

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. English for Civil Engineers by Andrea Pal-Liebscher.
2. Technical English for Civil Engineering by Juan Manuel IzarLandeta.
3. Phonetics and Phonology by Peter Roach.
4. Practical English Usage by Michael Swan.
5. Language and Communication by G.A. Miller.
6. Building Academic Reading Skills by Dorothy Zemach.
7. English for Architects and Civil Engineers by Sharon Heidenreich.
8. The Concise Adair on Communication and Presentation Skills by John Adair.
9. Communicative English for Engineers and Professionals by Nitin Bhatnagar, Mamta Bhatnagar.
10. Fundamental of Technical English for Engineering Students, Abdullah Al Mijan & Shafiqul Islam Sohel.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report	Quiz (%)	Board Viva (%)	In class Participation
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	(%)			(%)
Remember	20	20	20	20
Understand	20	40	50	30
Apply	30	40	20	30
Analyze	30		10	20

8.3.5. CE 2001

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2001 COURSE TITLE: Engineering Materials II		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the types, properties, applicability, and limitations of commonly used construction materials
CLO2	Recognize the quality control procedures in manufacturing, transporting, and placing of Portland Cement Concrete.
CLO3	Choose appropriate concrete materials and perform concrete mixes to be used in the construction.
CLO4	Understand the micro behavior of engineering materials and evaluate causes of chemical reactions in normal dry Reinforced concrete and offshore structures.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√		√									
CLO4	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Properties, uses, constituents and classification of engineering materials: brick, aggregate, cement, mortar, plaster, concrete, tiles, ferro-cement, geotextiles, plastic, rubber, glass, timber, etc.	8.0	CLO1
2	Properties of fresh and hardened concrete; admixture, normal strength, and high strength concrete; ready-mix concrete, concrete for special uses.	5.0	CLO2, CLO3
3	Concrete mix design using different codes: ACI, BS	5.0	CLO3

SN	COURSE CONTENT	Hrs	CLOs
4	Types and properties of fiber-reinforced polymer (FRP) composites and its application to civil engineering; available FRP composite products	5.0	CLO1
5	Definition of stress and strain; plane stress and strain conditions; identification of strain components of elastic, elastoplastic and elasto-visco-plastic materials; time-dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior	8.0	CLO1, CLO4
6	Corrosion and prevention of steel in RC structures, offshore structures, and ground applications.	8.0	CLO1, CLO4

TEXTBOOK:

1. A textbook of Engineering Materials, M A Aziz, Trans-World Book Co., 2004.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Fundamental of Building Construction Materials and Methods, E. Allen and J. Iano, John Wiley & Sons., NY, 2004.
2. Building Materials, S. K. Duggal, New Age International, 2009.
3. Text Book of Engineering Materials, S. Singh, Konark Publishers Pvt. Ltd.
4. Text Book of Engineering Materials, D.S.Arora, Kalyani Publishers.
5. B.C. Punmia, 'Building Construction' Laxmi Publications Pvt. Ltd.
6. Building Construction by Sushil Kumar, Standard Publishers, Delhi.
7. Concrete Technology, A. M. Neville and J. J. Brooks, 2nd Edition, Pearson Education Ltd, England, 1987,.
8. Concrete Technology: Theory and Practice, M S Shetty, Revised Edition, S. Chand Publication, 2008.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation: 30% (Marks: 90)

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination: 70% (Marks: 210)

Bloom's Category	Final Exam (%)
Remember	20
Understand	40
Apply	30
Analyze	-

Evaluate	10
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8.3.6. CE 2002

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2002 COURSE TITLE: Engineering Material Sessional		
CREDIT: 1.50 (Sessional)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform the physical tests for the different construction materials (i.e., cement, fine aggregate, coarse aggregate) and evaluate their engineering properties.
CLO2	Choose appropriate materials for a construction job.
CLO3	Control the quality of different construction materials (Evaluate).
CLO4	Comprehend and write effective reports; prepare documentation; make effective presentations; give clear instructions and communicate effectively.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1				√					√			
CLO2				√		√						
CLO3			√					√				
CLO4					√					√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction of Material testing laboratory and experimental devices. Demonstration about report writing	3.0	CLO4
2	Determination of Normal Consistency, Initial and final setting time of Cement	6.0	CLO1, CLO2, CLO3
3	Determination of Specific Gravity, Water Absorption Capacity, Total Evaporable Moisture Content of Fine and Coarse Aggregate.	6.0	CLO1, CLO2, CLO3, CLO4
4	Gradation, Unit Weight, Voids of Fine and Coarse Aggregates	6.0	CLO1, CLO2, CLO3, CLO4
5	Determination of Compressive and Tensile Strength of Cement Mortar	6.0	CLO1, CLO2; CLO3
6	Determination of Slump of Fresh Concrete (Influence of w/c ratio on Cement Concrete).	3.0	CLO1, CLO2, CLO3, CLO4

SN	COURSE CONTENT	Hrs	CLOs
7	Determination of Compressive strength, Splitting Tensile Strength, Flexural Strength of Cement Concrete	6.0	CLO1, CLO2, CLO3, CLO4
8	Determination of Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	3.0	CLO1, CLO2, CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Laboratory Manual, ASTM Standard requirements of specification.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation: 100% (Marks: 100)

Bloom's Category	Assignment (Class and Home) / Report: 50% (%)	Quiz: 30% (%)	Board Viva/Presentation 10% (%)	In class Participation: 10% (%)
Remember		30	50	50
Understand	20	40	30	50
Apply	25	30	20	
Analyze	25			
Evaluate	30			

8.3.7. CE 2003

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2003 COURSE TITLE: Mechanics of Solids I		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Recognize basic terminologies and theories associated with solid mechanics, i.e., stress, strain, determinate-indeterminate structures, and homogeneous-composite members.
CLO2	Analyze statically determinate beams and frames and draw axial force, shear force, and bending moment diagrams.
CLO3	Calculate and analyze stresses and deformations of different members subjected to various loading conditions and temperature changes using different approaches.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Concepts of stress and strain	2.0	CLO1
2	Constitutive relationships	2.0	CLO1
3	Analysis of members subjected to tension and compression	4.0	CLO1
4	Analysis of members subjected to shear	2.0	CLO1
5	Analysis of members subjected to temperature changes	3.0	CLO1
6	Elastic analysis of circular shafts, solid noncircular and thin-walled tubular members subjected to torsion	4.0	CLO1
7	Thin-walled pressure vessels	3.0	CLO1
8	Beam statics: reactions, axial force, shear force and bending moments	3.0	CLO2
9	Axial force, shear force and bending moment diagrams using method of section	3.0	CLO2
10	Axial force, shear force and bending moment diagrams using method of summation approach	3.0	CLO2
11	Flexural stress in beams	3.0	CLO3
12	Shear stress in beams	3.0	CLO3
13	Shear center	2.0	CLO3
14	Helical springs	2.0	CLO3

TEXTBOOK:

1. Mechanics of Materials, Roy R. Craig, John Wiley & Sons. 3rd Edition, 2010.

REFERENCE BOOKS:

1. Strength of Materials, Pytel, A. and Singer, F. L., 4th Edition, Harper Coollins Publisher, Singapore, 2013.
2. Mechanics of Materials, Beer, F. P., Johnston, E. R., Dewolf, J. T. and Mazurek, D. F. 5th Edition, McGraw Hill Education, USA, 2005.
3. Theory of Simple Structures, Shedd, T.C. and Vawter, J., 2nd Edition, John Wiley and Sons, New York, London, 2013.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	30	50
Apply	60	-
Analyze	-	-
Evaluate	-	-
Create	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam: 70% (Marks 210) (%)
Remember	10
Understand	20
Apply	40
Analyze	30
Evaluate	-
Create	-

8.3.8. CE 2005

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2005 COURSE TITLE: Fluid Mechanics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the fluid properties and calculate the hydrostatic pressure, buoyant force and check the stability of the static and buoyant bodies.
CLO2	Calculate and analyze flow velocity of fluid and energy loss during flow.
CLO3	Analyze the water distribution system through various pipe network configurations.
CLO4	Solve simple and complex flow-related problems using Dimensional and model analysis.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4		√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Development and scope of fluid mechanics; Fluid properties	3.0	CLO1
2	Fluid Statics: fluid pressure and its measurement, fluid masses subjected to acceleration, Equilibrium of floating body	6.0	CLO1
3	Fluid flow kinematics: flow types, streamline, pathline, rotation, velocity potential, stream function	4.0	CLO1, CLO2
4	Fluid dynamics: continuity, Bernoulli's, energy and momentum equations	4.0	CLO1, CLO2
5	Flow measuring devices: venturimeter, pitot tube, orifices, mouthpieces, nozzles, notch	3.0	CLO2
6	Fluid flow concept: laminar and turbulent flow	6.0	CLO1, CLO2
7	Boundary layer: boundary layer theory, boundary layer separation and its control	5.0	CLO1, CLO2
8	Water distribution through pipes, series and parallel pipes, pipe networks, syphon pipe	3.0	CLO3
9	Dimensional analysis and similitude, dimensionless number, and its application	5.0	CLO4

TEXTBOOK*:

1. Fluid Mechanics, with Engineering Applications, Robert Long Daugherty, Joseph B. Franzini, McGraw-Hill.

REFERENCE BOOKS*:

1. A Textbook of Fluid Mechanics, R.K. Rajput, S. Chand & Company Ltd. New Delhi, 1998.
2. A Textbook of Hydraulics and Fluid Mechanics, R.S. Khurmi, Chand & company Ltd. India, 1987.

*List of text and reference books may vary depending upon the choice of course teachers and time.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-
Create	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
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Remember	20
Understand	30
Apply	40
Analyze	10
Evaluate	-
Create	-

8.3.9. CE 2006

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2006 COURSE TITLE: Fluid Mechanics Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 2 nd Year 1 st Semester	
Exam Hours: NA	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform the physical tests for different hydraulic devices (i.e., weir, orifice, V-notch, etc.) to determine their capacity and efficiency.
CLO2	Choose an appropriate hydraulic device to meet the job/work demand.
CLO3	Comprehend and write effective reports, prepare documentation, make effective presentations, give and receive clear instructions.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√								√			
CLO2				√								
CLO3										√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Centre of Pressure	4.0	CLO1, CLO2, CLO3
2	Proof of Bernoulli's theorem	5.0	CLO1, CLO2, CLO3
3	Flow through venturimeter	4.0	CLO1, CLO2, CLO3
4	Flow through orifice	5.0	CLO1, CLO2, CLO3
5	Coefficient of velocity by coordinate method	5.0	CLO1, CLO2, CLO3
6	Flow through mouthpiece	3.0	CLO1, CLO2, CLO3

SN	COURSE CONTENT	Hrs	CLOs
7	Flow over V-notch	4.0	CLO1, CLO2, CLO3
8	Flow over sharp-crested weir	4.0	CLO1, CLO2, CLO3
9	Fluid friction in pipe.	5.0	CLO1, CLO2, CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. A textbook of Fluid Mechanics, R.K. Rajput, S. Chand & company Ltd. New Delhi, 1998.
2. A Textbook of Hydraulics and Fluid Mechanics, R.S. Khurmi, Chand & company Ltd. India, 1987.
3. Fluid Mechanics, with Engineering Applications - by Robert Long Daugherty, Joseph B. Franzini, McGraw-Hill.
4. Other resources: Laboratory Manual of Fluid Mechanics Sessional, Department of Civil Engineering, DUET, Gazipur.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.4. 2nd Year 2nd Semester

8.4.1. Math 2103

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Math 2103 COURSE TITLE: Matrices, Fourier Series and Vector Analysis		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: 3.0	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the properties of matrices, vectors, and Fourier series.
CLO2	Formulate and solve the engineering problems using matrix, vector, and Fourier series.
CLO3	Solve and interpret the boundary value problems with the help of Fourier analysis.
CLO4	Apply various theorems for solving Civil Engineering problems.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√										
CLO3			√		√							
CLO4			√				√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Definition of matrices; Scalars and Vectors: Equality of vectors, addition and subtraction of vectors, multiplication of vectors by scalars; Position vector of a point	3.0	CLO1,C LO2
2	Elementary transformation of matrices; Resolution of vectors; Scalar and vector product of two vectors and their geometrical interpretation;	3.0	CLO1,C LO2
3	Inverse and rank of matrices; Scalar and vector product of two vectors and their geometrical interpretation; Triple product and multiple product	3.0	CLO1, CLO2
4	Solution of linear system of equations; Application of multiple products to geometry and mechanics;	3.0	CLO1, CLO2
5	Fourier series and its properties; Differentiation and integration of vectors together with elementary application;	3.0	CLO1, CLO2
6	Fourier series and its properties; Differentiation and integration of vectors together with elementary application;	3.0	CLO1, CLO2
7	Expansion of periodic functions using Fourier series; Definition of line, surface, and volume integrals	3.0	CLO1, CLO2
8	Application of Fourier series; Definition of line, surface, and volume integrals	3.0	CLO1, CLO3
9	Fourier integral and its various properties; Gradient, divergence, and curl of point functions	3.0	CLO1, CLO2
10	Evaluating integrals using Fourier integral; Gradient, divergence and curl of point functions	3.0	CLO3, CLO4
11	Fourier transforms; Green's theorem and its applications	3.0	CLO3,

SN	Course Content/Topic	Hrs	CLOs
			CLO4
12	Fourier transforms and their various properties; Stoke's theorem and its applications,	3.0	CLO3, CLO4
13	Solving boundary value problems with the help of Fourier transforms; Gauss's theorem and its applications	3.0	CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS:

1. Vector Analysis, Schaum's Outline Series, M. Spiegel, S. Lipschutz and D. Spellman, 2nd edition.
2. Mathematical Methods, Volume-2, Prof. Md. Abdur Rahman
3. Linear Algebra, Prof. Md. Abdur Rahman
4. Co-ordinate Geometry with Vector Analysis, Rahman & Bhattacharjee
5. Co-ordinate Geometry and Vector Analysis, Khosh Mohammad

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	40
Apply	40
Analyze	
Evaluate	

8.4.2. CE 2007

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2007 COURSE TITLE: Engineering Geology and Geomorphology		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to

CLO1	Understand the formation process and mechanics of minerals, rocks, and geomorphic processes that modify the Earth's surface.
CLO2	Interpret geological maps, and practice geological concepts in an engineering context.
CLO3	Identify the distinctive landforms, sediments, and flow associated with a channel.
CLO4	Apply the knowledge and skills in geomorphology to interpret hydrologic data and evaluate the effects of river systems flow.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√	√										
CLO3	√			√								
CLO4	√		√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to Engineering Geology; geology of Bangladesh; minerals; identification of minerals, common rock forming minerals, physical properties of minerals; mineraloids; rocks; types of rocks, cycle of rock change; earthquake fundamentals; seismicity in Bangladesh; seismic map of Bangladesh; structural geology; faults, types of faults; fold and fold types.	20.0	CLO1, CLO2
2	Domes; basins; erosion process; quantitative analysis of erosional landforms; channel development; channel widening; valley shape; stream terraces; alluvial flood plains; deltas and alluvial fans; channel morphology; channel patterns and the river basin; geomorphology of Bangladesh; rivers and river basin of Bangladesh; case study of mega projects.	19.0	CLO2, CLO3, CLO4

TEXTBOOK:

1. Foundations of Engineering Geology, Waltham, A. , 3rd Edition, Spon Press, 2009.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Foundations of Engineering Geology, Waltham, A. , 3rd Edition, Spon Press, 2009.
2. Concepts in Geomorphology, Bierman, PR., and Montgomery, DR., Key New York (NY): W.H. Freeman and Company, 2014.
3. Engineering Geology, Bell, F.G., Burlington: Elsevier, 2007.
4. Practical Engineering Geology, Hencher, S., Spon Press, London, 2012.
5. Principles of Engineering Geology, Johnson, R.B. and DeGraff, J.V., Wiley, 1st Edition, 1998.
6. Earth: An Introduction to Physical Geology, Edward J. Tarbuck, Frederick K. Lutgens and Dennis G. Tasa. 12th edition, 2017.
7. Essentials of Geology, Stephen Marshak. Fifth edition, 2016.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	30
Understand	30
Apply	30
Analyze	-
Evaluate	10

8.4.3. CE 2009

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2009 COURSE TITLE: Mechanics of Solids II		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Distinguish the symmetrical and unsymmetrical bending of beam members and calculate the principal stresses, strains and response of deformable solids using different methods.
CLO2	Analyze cable and cable-supported structures.
CLO3	Understand different types of joints, connections, and modes of failure; design the joints under concentrically and eccentrically applied load.
CLO4	Calculate the deflection of statically determinate beams using different methods, and draw the deflected shape of beams under a given loading condition.
CLO5	Recognize buckling, modes of buckling, slenderness ratio and analyze the capacity of steel column under axial compression.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4	√	√										
CLO5	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Symmetrical and unsymmetrical bending	3.0	CLO1
2	Compound stress	4.0	CLO1
3	Transformation of stresses and failure criteria	5.0	CLO1
4	Elastic strain energy and external work	3.0	CLO1
5	Cable and cable supported structures	3.0	CLO2
6	Bolted, riveted and welded joint	8.0	CLO3
7	Deflection of statically determinate beams by moment area method, direct integration method, conjugate beam method, elastic load method	8.0	CLO4
8	Buckling of columns.	5.0	CLO5

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Strength of Materials, A. Pytel, F.L. Singer, Harper & Row Publishers, New York, 4th Edition, 2014
2. Engineering Mechanics of Solids, E. P. Popov, 2nd Edition, Pearson Education, India, 2015
3. Mechanics of Materials, R. C. Hibbler, Prentice Hall, 6th Edition, 2004;
4. Mechanics of Materials, J. M. Gere & B. J. Goodno 7th Edition, 2008;
5. Mechanics of Materials, P. Timoshenko, 4th Edition, PWS Pub Co., 1997.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	30	50
Apply	40	-
Analyze	20	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	30
Analyze	40
Evaluate	-

8.4.4. CE 2010

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2010 COURSE TITLE: Mechanics of Solids Sessional		
CREDIT: 1.50 (Sessional)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): at the end of the Course, the student will be able to

CLO1	Understand the fundamental behavior of different materials at different loading conditions.
CLO2	Evaluate the allowable loads and allowable stresses of different materials subjected to tension, compression, shear, torsion, bending, buckling, impact and combined stresses; take decision to select the appropriate structural materials for an engineering job/work.
CLO3	Design and conduct experiments as well as analyze and interpret data; present the results in a professional report form.
CLO4	Develop collaborative skills by working with other students in groups.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√	√									
CLO3		√	√									
CLO4			√	√								

SN	COURSE CONTENT	Hrs	CLOs
1	Tension test of mild steel specimen	3.0	CLO1, CLO2
2	Direct shear test of mild steel specimen	3.0	CLO1, CLO2
3	Impact test of mild steel specimen	3.0	CLO2, CLO3
4	Compression test of timber	3.0	CLO3, CLO4
5	Slender column test	3.0	CLO3, CLO4
6	Static bending test of simple beam	3.0	CLO3, , CLO4
7	Hardness test of metal	3.0	CLO2, CLO3
8	Helical spring test	3.0	CLO3, CLO4
9	Determination of shear center	3.0	CLO3, CLO4
10	Compound stress test	3.0	CLO3, CLO4
11	Riveted joint test	3.0	CLO3, CLO4
12	Welded joint test	3.0	CLO3, CLO4
13	Direct shear test of mild steel specimen	3.0	CLO3, CLO4

TEXTBOOK:

1. Mechanics of Materials, Roy R. Craig, John Wiley & Sons. 3rd Edition, 2010.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Laboratory manual for material testing.
2. Strength of Materials, A. Pytel, F.L. Singer, Harper & Row Publishers, New York, 4th Edition, 2014
3. Mechanics of Materials, Beer, F. P., Johnston, E. R., Dewolf, J. T. and Mazurek, D. F., 5th Edition, McGraw Hill Education, USA, 2005.
4. Theory of Simple Structures, Shedd, T.C. and Vawter, J., 2nd Edition, Jhon Wiley and Sons, New York, London, 2013.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation: 100% (Marks: 100)

Bloom's Category	Assignment (Class and Home) / Report: 50% (%)	Quiz: 30% (%)	Board Viva/Presentation 10% (%)	In class Participation: 10% (%)
Remember	30	40	50	50
Understand	40	40	30	50
Apply	30	20	20	
Analyze				
Evaluate				

8.4.5. CE 2012

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2012 COURSE TITLE: Computer Programming Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the basic computer system, flow diagram and the basic programming ideas with data types, operators, and expressions.
CLO2	Write the codes of the program using an array, pointers, functions, etc., for simple mathematical operations and processes.
CLO3	Compile the programs to solve civil engineering problems and work with the classes and objects.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√				√							
CLO3		√			√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Programming concepts and algorithms	3.0	CLO1
2	Internal representation of data	3.0	CLO1
3	Data types, operators, expressions, control structures	6.0	CLO1
4	Arrays	6.0	CLO1, CLO2
5	Pointers	3.0	CLO1, CLO2, CLO3
6	Functions	6.0	CLO1, CLO2,
7	References and dynamic allocation	3.0	CLO1, CLO2,
8	Concept of Object-Oriented Programming (OOP)	3.0	CLO1, CLO3
9	Computer application to civil engineering problems.	6.0	CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Teach Yourself C , Herbert Schildt, Third Edition, 1997.
2. Teach Yourself C++, Herbert Schildt, Third Edition, 1994.
3. The C++ Programming language, Bjarne Stroustrup, Fourth Edition, 2014.
4. C++ Primer, Stanley B. Lippman, Josse Lajoie, Barbara E. Moo, Fifth Edition.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	20	20	20	20
Understand	35	35	50	30
Apply	35	35	20	30
Analyze	10	10	10	20

8.4.6. CE 2014

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2014 COURSE TITLE: Architectural, Engineering and Planning Appreciation Sessional		
CREDIT: 1.50 (Sessional)	TERMS OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Interpret architectural, mechanical engineering, plumbing issues related to civil engineering problems.
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CLO2	Prepare and deliver professional technical observation on architectural, mechanical, urban, and regional planning and environmental issues concerned with civil engineering practice.
CLO3	Analyze, synthesize, and apply information related to architectural, mechanical engineering, urban and regional planning, and environmental issues linked with civil engineering applications.
CLO4	Identify problems and deliver solutions to the architect, mechanical engineer, urban and regional planner, environmental engineer, and other involved specialists.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√					√	√					
CLO2			√			√						
CLO3						√						
CLO4									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Appreciation of architecture;	11.0	CLO1, CLO2
2	Mechanical engineering related to civil engineering fields;	8.0	CLO1, CLO2
3	Urban and regional planning;	10.0	CLO2, CLO3
4	Environmental issues.	10.0	CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Conceptual structural design: bridging the gap between architects and engineers by Olga Popovic Larsen, ICE Publishing, London, 2016.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation: 100% (Marks: 100)

Bloom's Category	Assignment (Class and Home) / Report: 50% (%)	Quiz: 30% (%)	Board Viva/Presentation 10% (%)	In class Participation: 10% (%)
Remember			50	50
Understand	20	20	30	50
Apply	25	25	20	
Analyze	25	25		
Evaluate	30	30		

8.4.7. CE 2101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2101 COURSE TITLE: Design of Concrete Structures I		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the properties of constituent materials in the Reinforced Concrete structure and their failure modes.
CLO2	Understand the principles of the design methodologies of Reinforced Concrete members and evaluate their suitability.
CLO3	Analyze and design different beams under various loading conditions following Ultimate Strength Design (USD) method.
CLO4	Analyze and design different slabs under various loading conditions following strip method, direct design method, and equivalent frame method.
CLO5	Calculate deflection in Reinforced Concrete beams and slabs.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3		√	√									
CLO4		√	√									
CLO5		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Properties of materials for reinforced concrete; normal-strength and high-strength concrete;	2.0	CLO1
2	Introduction to different design methods: allowable stress design (ASD), ultimate strength design (USD) and limit states design (LSD)	3.0	CLO2
3	Analysis and design of singly reinforced, doubly reinforced and T-beams for flexure, shear, and torsion by USD method.	14.0	CLO3
4	Floor systems of reinforced concrete buildings; analysis and design of edge-supported slabs following USD guidelines and using strip method, direct design method and equivalent frame method;	12.0	CLO4
5	Bond, anchorage, and development length according to USD method;	4.0	CLO3
6	Deflection of reinforced concrete beams and edge supported slab.	4.0	CLO5

TEXTBOOK:

1. Design of Concrete Structures, D. Darwin and C.W. Dolan, 16th edition, McGraw Hill Companies Inc., New York.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Design of Concrete Structures, D. Darwin, C.W. Dolan and A.H. Nilson, 15th edition, McGraw Hill Companies Inc., New York.
2. Design of Concrete Structures, A.H. Nilson, D. Darwin and C.W. Dolan, 14th edition, McGraw Hill Companies Inc., New York.
3. Structural Concrete, M. N. Hassoun and A. Al-Manaseer, 6th edition, John Wiley & Sons, Inc., Hoboken, New Jersey.
4. Design of Concrete Structures, G. Winter, C.E. O'Rourke, and A. H Nilson an, 7th edition, McGraw Hill Companies Inc., New York.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In-class Participation (%)
Remember	10	50
Understand	30	50
Apply	40	-
Analyze	20	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	10
Apply	30
Analyze	40
Evaluate	10

8.4.8. CE 2016

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2016 COURSE TITLE: Detailing of Concrete Structures Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SIE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the importance of proper detailing of reinforced concrete slabs, beams, columns, beam-column joints, stairs, lintel, and footing.
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CLO2	Understand the safety provisions for RC members as specified by the Code.
CLO3	Identify and locate the placement of reinforcement in concrete slabs, beams, columns, beam-column joints, stair and lintel, footing.
CLO4	Develop collaborative skills by working with other students in groups.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√	√									
CLO2			√	√								
CLO3			√								√	
CLO4			√			√			√			

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Detailing of reinforced concrete (RC) slabs, beams, columns, beam-column joints, lintel and stair slabs.	10.0	CLO1, CLO2, CLO3, CLO4
2	Seismic detailing of reinforced concrete members and structures	9.0	CLO1, CLO2, CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Bangladesh National Building Code (BNBC)
2. ACI Detailing Manual by American Concrete Institute
3. Design of Concrete Structures, D. Darwin, C.W. Dolan and A.H. Nilson, 15th edition, McGraw Hill Companies Inc., New York.
4. Design of Concrete Structures, D. Darwin and C.W. Dolan, 16th edition, McGraw Hill Companies Inc., New York.
5. Design of Concrete Structures, A.H. Nilson, D. Darwin and C.W. Dolan, 14th edition, McGraw Hill Companies Inc., New York.
6. Structural Concrete, M. N. Hassoun and A. Al-Manaseer, 6th edition, John Wiley & Sons, Inc., Hoboken, New Jersey.
7. Design of Concrete Structures, G. Winter, C.E. O'Rourke, and A. H Nilson an, 7th edition, McGraw Hill Companies Inc., New York.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation: 100% (Marks: 100)

Bloom's Category	Assignment (Class and Home) / Report: 50% (%)	Quiz: 30% (%)	Board Viva/Presentation 10% (%)	In class Participation: 10% (%)
Remember	40	40	50	50
Understand	30	40	30	50
Apply	30	20	20	
Analyze				

Evaluate				
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8.4.9. CE 2201

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2201 COURSE TITLE: Open Channel Flow		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Classify the types of flow and calculate the flow parameters of an open channel under different circumstances.
CLO2	Compute and draw the water surface profiles for gradually varied flow.
CLO3	Calculate and analyze energy dissipation parameters in rapidly varied flow and design USBR stilling basin based on different hydraulic jumps.
CLO4	Analyze and design erodible and non-erodible channels.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√	√										
CLO3		√	√									
CLO4			√									

Alignment of Topics of the Course with Contact Hours and CLOs

	COURSE CONTENT	Hrs	CLOs
1	Open channel flow and classification; properties of an open channel; pressure distribution; primary open channel flow equations.	5.0	CLO1
2	Critical flow and its computation; channel transition: vertical and horizontal contractions.	7.0	CLO1
3	Concept of uniform flow: resistance equation, roughness coefficient, shear stress, and velocity distribution, computation of uniform flow, compound channel.	7.0	CLO1
4	Gradually varied flow: dynamic equation, classification of flow profiles, computation of flow profiles by numerical and analytical methods.	8.0	CLO2
5	Rapidly varied flow: hydraulic jump, energy dissipation, stilling basin.	5.0	CLO3; CLO1
6	Design of open channels: best hydraulic section, mobile and rigid boundary channels.	7.0	CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Open-Channel Hydraulics, Ven Te Chow, McGraw-Hill.
2. Open-Channel Flow, Chaudhry, M Hanif, Springer.
3. Flow in Open Channels, K. Subramanya, Third Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997.
4. Hydraulics of Open Channel Flow, Hubert Chanson, Elsevier.
5. Flow through Open Channels, K.G. Ranga Raju, Tata McGraw-Hill Education, 1991.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	40
Analyze	20
Evaluate	10
Create	

8.4.10. CE 2202

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 2202 COURSE TITLE: Open Channel Flow Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 2 nd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform hands-on experiments to determine discharge using different flow measuring devices, the coefficient of roughness (Manning's n), velocity distribution for a channel, and thrust on sluice gate individually or in a group.
CLO2	Conduct laboratory experiments to prepare the surface profiles for gradually

	varied flow and classify the hydraulic jump individually or in a group.
CLO3	Comprehend and write effective reports, communicate with proper documentation and presentation.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√								√			
CLO2				√								
CLO3										√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Broad-crested weir, venturi flume, Parshall flume, cut-throat flume;	5.0	CLO1, CLO2, CLO3
2	Manning's roughness coefficient for channel bed and Velocity distribution profile for open channel	2.0	CLO1, CLO2, CLO3
3	Specific energy and specific force	3.0	CLO1, CLO2, CLO3
4	Thrust on sluice gate	3.0	CLO1, CLO2, CLO3
5	Determination and classification hydraulic jump	3.0	CLO1, CLO2, CLO3
6	Gradually varied flow profiles	3.0	CLO1, CLO2, CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Open-Channel Hydraulics, Ven Te Chow, McGraw-Hill, New York.
2. Flow in Open Channels, K. Subramanya, Third Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997.
3. Laboratory Manual of Open Channel Flow Sessional, Department of Civil Engineering, DUET, Gazipur.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	40	40	20	50
Understand	30	40	50	50

Apply	30	20	30	
Analyze				
Evaluate				

8.5. 3rd Year 1st Semester

8.5.1. Math 3101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: Math 3101 COURSE TITLE: Numerical Methods and Statistics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 3 rd Year 1 st Semester	
Exam Hours: 3.0	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the concepts of Numerical Methods in solving Civil Engineering problems.
CLO2	Apply the rigorous, analytical, highly numerate approach to analyze and solve Civil Engineering problems using Numerical Methods.
CLO3	Organize and display data utilizing various tables, charts, and graphs. Also, able to compute the probabilities using the basic rules of probability.
CLO4	Summarize the concept of approximation, quantities, estimation, error, precision, and accuracy in interpreting the results to reach conclusions.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√		√									
CLO2		√		√								
CLO3	√	√										
CLO4		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Solution of Algebraic equations, Graphical method, Iterative method & Statistics and its origin;	3.0	CLO1, CLO2
2	Newton's method, Gauss reduction formulae for linear interpolation: Forward and backward difference table; & Summarizing Data;	3.0	CLO1, CLO3
3	Newton's formula for forward, backward and divided difference, Lagrange's interpolation formula & Measure of central tendency.	3.0	CLO1, CLO3
4	Use of Newton's interpolation formula & Measure of central tendency (Real Problem Solutions)	3.0	CLO2, CLO3

SN	Course Content/Topic	Hrs	CLOs
5	Douglas-Avakian method, Graphical differentiation maxima-minima & Measures of dispersion,	4.0	CLO3, CLO4
6	Raphson's methods & Measures of dispersion (Real Problem Solutions)	4.0	CLO2, CLO4
7	Trapezoidal rule, Simpson's rule & Elementary probability theory	3.0	CLO1, CLO4
8	Trapezoidal rule, Simpson's rule & Discontinuous probability distributions	3.0	CLO2, CLO3
9	Use of Lagrange's interpolation formula, Graphical integration & Continuous probability distributions	3.0	CLO1, CLO3
10	Curve fitting by least squares methods & Mathematical Expectation	3.0	CLO2, CLO4
11	Solution of the differential equation; Adam's method for 1 st order equation, Picard's method & Elementary Sampling theory, Estimation, Hypothesis testing	4.0	CLO2, CLO3
12	Runge's method, Kutta's method, Finite difference method & Correlation & Regression analysis	3.0	CLO2, CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Numerical Analysis, R. L. Burden, D. J. Fairies and A. M. Burden, 10th edition, Cengage Learning.
2. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, India.
3. Numerical Analysis, A.R. Vasishtha, Krishna Prakashan, India.
4. An Introduction to Statistics and Probability, Md. Nurul Islam, 3rd edition, Book World, Dhaka.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	30
Understand	40
Apply	30

Analyze	
Evaluate	

8.5.2. CE 3002

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3002 COURSE TITLE: Engineering Computation Sessional		
CREDIT: 1.5 (Sessional)	TERMS OFFERED: 3 rd Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the use of advanced computational programming tools.
CLO2	Solve the numerical problems such as basic matrix computation, solving systems of linear equations, non-linear equations, differential equations, interpolation and curve fitting, numerical differentiation, numerical integration.
CLO3	Apply the programming knowledge to solve the civil engineering problems such as numerical solution of the equation of motion, statistical data analysis and representation, solving problems related to mechanics, hydraulics.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√				√							
CLO2	√				√							
CLO3		√			√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to advanced computational programming tools	3.0	CLO1
2	Application to numerical analysis: basic matrix computation	6.0	CLO1, CLO2
3	Solving systems of linear equations, non-linear equations, differential equations	6.0	CLO1, CLO2
4	Interpolation and curve fitting, numerical differentiation, numerical integration	6.0	CLO1, CLO2
5	Application to civil engineering problems: numerical solution of equation of motion	6.0	CLO1, CLO3
6	Statistical data analysis and representation	6.0	CLO1, CLO3
7	Solving problems related to mechanics, hydraulics, etc.	6.0	CLO1, CLO3

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. MATLAB Programming for Engineers, S. J. Chapman, Thomson Learning.
2. Getting Started with MATLAB 7: A Quick Introduction for Scientists and Engineers, R. Pratap, Oxford University Press, USA.
3. MATLAB Programming for Numerical Analysis, C. Lopez, Apress, 1st Edition.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	20	20	20	50
Understand	35	35	50	50
Apply	45	45	30	
Analyze				

8.5.3. CE 3101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3101 COURSE TITLE: Structural Analysis		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 3 rd Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform approximate and exact analysis of statically determinate and indeterminate beams, frames, trusses, and arches under different loading conditions.
CLO2	Construct influence lines for statically determinate beams/girders, frames, and trusses; analyze girders, frames, and trusses under moving loads.
CLO3	Calculate deflection of frames and trusses by virtual work method.
CLO4	Analyze cables and suspension bridges.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Stability and determinacy of structures; analysis of statically determinate beams, frames, and arches; approximate analysis of statically indeterminate structures: portal frames, mill bents, indeterminate trusses, multi-story building frames under vertical loads and lateral loads: portal method and cantilever method; wind and earthquake load on structures.	26.0	CLO1, CLO2
2	Influence lines for statically determinate beams/girders, frames, and trusses; analysis of girders, frames and trusses under moving loads; deflection of frames and trusses by virtual work method; analysis of cables and suspension bridges.	26.0	CLO3, CLO4

TEXTBOOK:

1. Theory of Simple Structures, T.C. Shedd and J. Vawter, 2nd edition, John Wiley and Sons Inc., New York.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Structural Analysis, P. Hall, 10th edition.
2. Elementary Structural Analysis, S. Utku, C.H. Norris and J.B. Wilbur, 4th edition, Tata McGraw-Hill.
3. Fundamentals of Structural Analysis, by Leet, Wang and Gilbert, 4th edition, McGraw-Hill Companies Inc., New York.
4. Basic Structural Analysis, C. S. Reddy, 3rd edition, McGraw-Hill, India.
5. Structural Analysis: In Theory and Practice, A. Williams, 1st edition, Elsevier.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In-class Participation (%)
Remember	10	50
Understand	20	50
Apply	40	-
Analyze	30	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	35
Analyze	40
Evaluate	-

Create	-
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8.5.4. CE 3103

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3103 COURSE TITLE: Design of Concrete Structures II		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 3 rd year 1 st semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the behavior of slabs, columns, footings, shear walls, and deep beams in reinforced concrete structures.
CLO2	Analyze and design various types of columns, slabs, individual footings, raft foundation, pile caps, shear walls, deep beams, and retaining walls.
CLO3	Understand the behavior of prestressing system and calculate losses in prestress concrete elements.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√	√									
CLO2		√	√									
CLO3		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Floor systems in RC structures; Analysis of column supported slab system; Yield line method for analyzing RC slab; Design of Reinforced Concrete (RC) columns: Long and short columns; Design of RC footings: Individual footing, combined footing, pile cap and raft.	26.0	CLO1, CLO2
2	Design of RC retaining walls, RC shear walls, and deep beams; Introduction to prestressed concrete, Prestressed concrete (PC) members, materials, and systems; Preliminary design of prestressed beam section; Losses of prestress.	26.0	CLO1, CLO2, CLO3

TEXTBOOK:

- Design of Concrete Structures, D. Darwin, C.W. Dolan and A.H. Nilson, 15th edition, McGraw Hill Companies Inc., New York.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Structural Concrete, M. N. Hassoun and A. Al-Manaseer, 6th edition, John Wiley & Sons, Inc., Hoboken, New Jersey.
2. Design of Concrete Structures, D. Darwin and C.W. Dolan, 16th edition, McGraw Hill Companies Inc., New York.
3. Design of Concrete Structures, A.H. Nilson, D. Darwin and C.W. Dolan, 14th edition, McGraw Hill Companies Inc., New York.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	30	50
Apply	30	-
Analyze	15	-
Evaluate	15	

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	30
Analyze	25
Evaluate	15

8.5.5. CE 3105

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3105 COURSE TITLE: Design of Steel Structures		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 3 rd Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the plastic hinge formation and collapse mechanism of flexural members.
CLO2	Use AISC Steel Construction Manual for structural steel member design.
CLO3	Analyze and design steel beam-column members and joints for tension, compression, and flexure.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√											
CLO3		√	√									

SN	COURSE CONTENT	Hrs	CLOs
1	Types and properties of structural steel; introduction to structural steel design philosophy: ASD and LRFD methods; Design manual, specifications, and building code requirements for steel structures; analysis and design of tension and compression members;	20.0	CLO1, CLO2, CLO3
2	Bolted and welded connections; analysis and design of beam and beam-column members; design moment connections, column bases and beam bearing supports; plastic hinge and collapse mechanism; detailing of steel structures.	19.0	CLO1, CLO2, CLO3

TEXTBOOK:

1. Steel Design, D. William, T. Segui, 5th Edition, Cengage Learning, CT, USA.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Unified Design of Steel Structures, L. F. Geschwindner, 2nd edition, J. Wiley and sons Inc., NewYork.
2. Structural Steel Design, J. C. McCormac and S. F. Csernak, 5th edition, Pearson, NewYork.
3. Design of Steel Structures: Theory and Practice, D. N. Subramanian, OXFORD UNIVERSITY PRESS, USA.
4. Steel Structures Design: ASD/LRFD, A. Williams, 1st edition, McGraw Hill Education, NewYork.

ASSESSMENT PATTERN

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Create	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	35
Analyze	35
Evaluate	-

8.5.6. CE 3106

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3106 COURSE TITLE: Design of Steel Structures Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 3 rd Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Analyze steel trusses, plate girders, and different types of connections.
CLO2	Design steel trusses, plate girders, and different types of connections.
CLO3	Evaluate and select the appropriate type of joint for a structure with details.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√	√									
CLO3		√								√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduce with trusses, plate girder and types of loads acted on these structures	6.0	CLO1, CLO2, CLO3
2	Analyze the trusses	6.0	CLO1
3	Design the trusses	7.0	CLO1
4	Analyze the plate girder	6.0	CLO2
5	Design the plate girder	7.0	CLO2
6	Analysis and design of the joints	7.0	CLO3

TEXTBOOK:

1. Steel Design, W. T. Segui, 5th edition, Cengage Learning, United States.

REFERENCE BOOKS:

1. Unified Design of Steel Structures, L. F. Geschwindner, 2nd edition, J. Wiley and sons Inc., NewYork.
2. Structural Steel Design, J. C. McCormac and S. F. Csernak, 5th edition, Pearson, NewYork.
3. Design of Steel Structures: Theory and Practice, D. N. Subramanian, OXFORD UNIVERSITY PRESS, USA.
4. Steel Structures Design: ASD/LRFD, A. Williams, 1st edition, McGraw Hill Education, NewYork.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	30	35	20	50
Understand	40	30	50	50
Apply	30	35	30	
Analyze				
Evaluate				

8.5.7. CE 3301

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3301 COURSE TITLE: Principles of Soil Mechanics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 3 rd year 1 st semester	
Exam Hours: 4.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Identify the type of soil from their index properties.
CLO2	Understand permeability and seepage flows through saturated soils.
CLO3	Distinguish between compaction and consolidation by identifying consolidation and compactions properties.
CLO4	Calculate effective stress, stress distribution, lateral earth pressure, settlement, and shear strength parameters.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to geotechnical engineering, Formation, type and identification of soils, Soil composition, soil structure and fabric, Index properties of soils, Engineering classification of soils	16.0	CLO1
2	Soil compaction and Consolidation, Compressibility and settlement behavior of soils	14.0	CLO3
3	Permeability and seepage, Principles of total and effective stresses, Stress-strain characteristics of soils, Stress distribution, Lateral earth pressure	22.0	CLO2, CLO4

TEXTBOOK:

1. Principles of Geotechnical Engineering, B. M. Das and K. Sobhan, SI Edition, 9th edition, Cengage Learning.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Principles of Geotechnical Engineering, B. M. Das and K. Sobhan, SI Edition, 9th edition, Cengage Learning.
2. Craig's Soil Mechanics, J.A. Knappett, 8th Edition, Spoon Press.
3. Soil Mechanics and Foundations, R. F. Craug, 7th Edition, Taylor & Francis.
4. Soil Mechanics and Foundations, M. Budhu, 3rd Edition, John Wiley & Sons, Inc., USA.
5. Soil Mechanics, V. N. Kaliakin, 1st edition, Elsevier Science.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	30
Apply	40
Analyze	20
Evaluate	-

8.5.8. CE 3302

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3302 COURSE TITLE: Geotechnical Engineering Laboratory		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 3 rd Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Plan a geotechnical investigation campaign for field and laboratory testing.
CLO2	Select all necessary field and laboratory tests for a particular site following standard methodology.
CLO3	Analyze the results of a geotechnical investigation and testing program.
CLO4	Recommend geotechnical parameters for design based on the interpretation and analysis of the results of a geotechnical investigation and testing program.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1				√					√			
CLO2		√		√								
CLO3		√			√							
CLO4		√					√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Field identification and testing of soils	2.0	CLO1, CLO2, CLO4
2	Determination of specific gravity and Atterberg limits	2.0	CLO1, CLO3, CLO4
3	Grain size analysis and permeability test	3.0	CLO1, CLO3, CLO4
4	Unconfined compression and compaction test	3.0	CLO1, CLO3, CLO4
5	Determination of field density and relative density of soil	3.0	CLO1, CLO3, CLO4
6	Direct shear tests	3.0	CLO1, CLO3, CLO4
7	Consolidation tests	3.0	CLO1, CLO3, CLO4

TEXTBOOK:

1. Geotechnical Engineering Investigation Handbook, R. E. Hunt, 2nd Edition, CRC Press/Taylor & Francis McGraw-Hill.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Geotechnical Engineering Investigation Handbook, R. E. Hunt, 2nd Edition, CRC Press/Taylor & Francis McGraw-Hill.
2. Manual of Soil Laboratory Testing. K. H. Head, Volume 1 and Volume 2, 2nd edition, John Wiley and Sons Inc. NewYork.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.6. 3rd Year 2nd Semester

8.6.1. CE 3107

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3107 COURSE TITLE: Analysis of Indeterminate Structures		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the degree of indeterminacy of various indeterminate structures.
CLO2	Assemble stiffness matrices and develop an algorithm for implementing the direct stiffness method in a computer.
CLO3	Draw the influence line of statically indeterminate beams and frames; use the influence line to calculate the moving load effects on structures.
CLO4	Analyze the statically indeterminate beams, frames, space truss subjected to different load types using different methods.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Analysis of statically indeterminate beams and frames by moment distribution method, slope deflection method;	10.0	CLO1; CLO4
2	Influence lines of statically indeterminate beams and frames;	10.0	CLO1; CLO3,
3	Analysis of space truss.	6.0	
4	Analysis of statically indeterminate beams, frames by consistent deformation/flexibility method;	13.0	CLO1; CLO4
5	Stiffness methods, assembly of stiffness matrices; Algorithms for implementing direct stiffness method in computer.	13.0	CLO1; CLO2,

TEXTBOOK:

- Intermediate Structural Analysis, C. K. Wang, 1st edition, McGraw-Hill.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

- Indeterminate Structures, R. L. Jindal, 2nd edition, S. Chand.
- Elementary Structural Analysis, C. H. Norris, J. B. Wilbur and S. Utku, 3rd edition, Mcgraw-Hill. USA.
- Structural Analysis, A. Ghali and A. M. Neville, 6th edition, E & FN Spon/Taylor and Francis.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	20	50
Apply	40	-
Analyze	30	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	30

Analyze	40
Evaluate	-

8.6.2. CE 3108

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3108 COURSE TITLE: Bridge Design Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Distinguish different types of bridges; calculate the loads required to design the bridges; relate different codes related to bridges; select bridge types based on location.
CLO2	Identify different components of bridges, the present status of bridges in Bangladesh.
CLO3	Analyze and design different types of bridges.
CLO4	Use software to analyze and design bridges.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2	√											
CLO3		√	√									
CLO4					√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to different types of bridge, loads on bridge, code specification for bridge design.	3	CLO1
2	Different components of bridges, present status of bridges in Bangladesh.	6	CLO2
3	Analysis and design of slab bridge.	6	CLO3
4	Analysis and design of deck girder bridge.	6	CLO3
5	Analysis and design of pre-stressed concrete bridge.	6	CLO3
6	Analysis and design of balanced cantilever bridge.	6	CLO3
7	Introduction to bridge design software.	6	CLO4

TEXTBOOK:

REFERENCE BOOKS:

1. Design of Concrete Structures, D. Darwin, C.W. Dolan and A.H. Nilsson, 15th edition, McGraw Hill Companies Inc., New York.
2. Structural Concrete, M. N. Hassoun and A. Al-Manaseer, 6th edition, John Wiley & Sons, Inc., Hoboken, New Jersey.
3. ASSHTO: Standard Specifications for Highway Bridges.
2. Bridge Design Handbook, Department of Civil Engineering, Dhaka University of Engineering and Technology, Gazipur, Bangladesh.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.6.3. CE 3201

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3201 COURSE TITLE: Hydrology		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand and calculate the hydrological parameters, i.e., rainfall, evapotranspiration, streamflow, groundwater flow.
CLO2	Develop discharge hydrographs from catchments and the routing of flood hydrographs along stream channels and within reservoirs.
CLO3	Analyze design storm and flood magnitude based on a frequency analysis of historical data and demonstrate hydrologic models.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√	√									
CLO2		√	√									
CLO3		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Concepts of hydrology; Hydrologic cycle; Catchment characteristics; Weather and hydrology: atmospheric circulation, water vapor, precipitable water; Climate change and hydrological challenges in Bangladesh; Precipitation and its measurement; Preparation and analysis of rainfall data: averaging depth, rainfall hyetograph, intensity-duration-frequency (IDF) relationship; Interception and depression storage; Evaporation; Evapotranspiration; Infiltration; Ground water: occurrence, distribution and movement of ground water.	20.0	CLO1
2	Runoff process and computation; Determination of storage capacity; Flow-duration relationship; Stream flow and stream gauging: site selection for stream gauging, measurement and relationship of stage and discharge; Hydrograph and its analysis; Statistical methods in hydrology: methods of determining design flood; frequency analysis; Hydrologic routing: reservoir routing and river routing; Concepts of hydrological modeling.	19.0	CLO2, CLO3

TEXTBOOK:

1. Engineering Hydrology, K. Subramanya, 4th edition, Tata McGraw Hill Education Limited.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. A Textbook of Hydrology, P. J. R. Reddy, 3rd edition, University Science Press.
2. Hydrology and Water Resources Engineering, S. K. Garg, 5th or later edition, KHANNA PUBLISHERS.
3. Handbook of Applied Hydrology, V. P. Singh, 2nd edition, McGraw Hill Education.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	30
Apply	30
Analyze	30
Evaluate	-
Create	-

8.6.4. CE 3303

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3303 COURSE TITLE: Foundation Engineering		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Select the suitable techniques of sub-soil investigation for different situations and their application in geotechnical fields.
CLO2	Estimate the settlement, distortion, and bearing capacity to design deep and shallow footings following accepted engineering practice and standards.
CLO3	Design a foundation and monitor the construction process.
CLO4	Apply knowledge of various methods and their assumptions to the stability analysis of natural and human-made slopes.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√		√								
CLO2	√	√										
CLO3			√									
CLO4		√					√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Soil investigation techniques, Types of foundation	9.0	CLO1
2	Bearing capacity of shallow and deep foundations	10.0	CLO2
3	Settlement computation, settlement and distortion of foundation	8.0	CLO2
4	Design and construction of footings, rafts and pile	6.0	CLO3

SN	COURSE CONTENT	Hrs	CLOs
5	Slope stability analyses	6.0	CLO4

TEXTBOOK:

1. Craig's Soil Mechanics, R.F. Craig, 7th Edition, Spon Press.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Craig's Soil Mechanics, R.F. Craig, 7th Edition, Spon Press.
2. Craig's Soil Mechanics, R.F. Craig and J. A. Knappett, 8th Edition, Spoon Press.
3. Soil Mechanics and Foundations, M. Budhu, 3rd Edition, John Wiley & Sons, Inc., USA.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	20
Analyze	25
Evaluate	10
Create	15

8.6.5. CE 3304

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3304 COURSE TITLE: Foundation Engineering Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Calculate lateral earth pressures, loading-induced stresses and displacements, and bearing capacity of shallow foundations.
CLO2	Design retaining walls, shore protection systems, and foundations.

CLO3	Evaluate design options and specify final design recommendations based on sustainability, construction feasibility, and cost-effectiveness.
CLO4	Create the ability to communicate designs visually using computer-aided drawings.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1				√					√			
CLO2		√		√								
CLO3		√			√							
CLO4		√					√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Design of shallow foundations including raft	6	CLO1, CLO2, CLO3, CLO4
2	Design of pile and pile cap	3	CLO1, CLO2, CLO3, CLO4
3	Design of pier and caisson	3	CLO1, CLO2, CLO3, CLO4
4	Design of shore pile	3	CLO1, CLO2, CLO3, CLO4
5	Design of retaining walls	3	CLO1, CLO2, CLO3, CLO4

TEXTBOOK:

1. Principles of Foundation Engineering, B. M. Das, 7th, INTERNATIONAL ECONOMY EDITION, Cengage, India.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Bangladesh National Building Code (BNBC).
2. Principles of Geotechnical Engineering, B. M. Das and K. Sobhan, SI Edition, 9th edition, Cengage Learning.
3. Craig's Soil Mechanics, R.F. Craig and J. A. Knappett, 8th Edition, Spoon Press.
4. Soil Mechanics and Foundations, M. Budhu, 3rd Edition, John Wiley & Sons, Inc., USA.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
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Remember	10	10	20	20
Understand	15	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	15	10		

8.6.6. CE 3401

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3401 COURSE TITLE: Environmental Engineering-I		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand climate change, biodiversity, solid waste management, air pollution control, environmental impact assessment, and water safety plans.
CLO2	Select suitable water supply sources and estimate water demand for various purposes.
CLO3	Evaluate the quality and requirements of water for drinking and other purposes.
CLO4	Analyze and design water treatment units/processes and distribution networks.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√					√	√					
CLO2		√										
CLO3	√					√						
CLO4	√			√								

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to Environmental Engineering: ecology and environment; climate change; biodiversity.	4.0	CLO1
2	Water Supply Engineering: introduction; water requirements; estimation of water use; fire demand;	4.0	CLO2
3	Water supply sources; surface water collection and transportation; head works;	4.0	CLO2
4	Groundwater exploration; aquifer properties and groundwater flow;	3.0	CLO2
5	Pumping system; shallow hand tubewells, deep tubewells, deep set pumps and alternative water supplies for problem areas;	4.0	CLO2
6	Water quality requirements; drinking water quality standards;	2.0	CLO3

SN	COURSE CONTENT	Hrs	CLOs
7	Planning and design considerations of water treatment plant; water treatment- plain sedimentation, coagulation, flocculation, filtration, disinfection; miscellaneous treatment methods;	4.0	CLO4
8	Iron and arsenic removal units; salinity removal; low-cost treatment methods for rural communities;	3.0	CLO4
9	Water safety plans	2.0	CLO1
10	Water distribution systems: analysis and design of distribution network; fire hydrants; water meters; leak detection; unaccounted for water.	4.0	CLO4
11	Introduction to air pollution.	3.0	CLO1
12	Solid and hazardous waste management	4.0	CLO1
13	Environmental management and environmental impact assessment	3.0	CLO1

TEXTBOOK:

1. Water and Environmental Engineering, M. H. Rahman and A. A. Mueyed, 1st edition, ITN, BUET.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time)

1. Water Supply and Sanitation for rural and low-income urban communities, M. F. Ahmed and M. M. Rahman, 3rd edition, ITN, BUET.
2. Environmental Engineering, H. S. Peavy and D. R. Rowe, G. Tchobanoglous, 1st edition, McGraw Hill, India.
3. Solid and Hazardous Waste Management, M. H. Rahman and A. A. Mueyed, 1st edition, ITN, BUET.
5. Air Pollution, M. N. Rao AND H.V.N Rao, 1st edition, McGraw Hill, India.
6. Municipal Solid Waste Management, M. A. I. Chowdhury, 1st edition, University Grant Commission, Bangladesh.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	50	50
Apply	30	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	35
Analyze	25

Evaluate	10
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8.6.7. CE 3402

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3402 COURSE TITLE: Environmental Engineering-I Sessional		
CREDIT: 0.75(Sessional)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Apply the acquired knowledge and techniques to water and air sampling and preserving the water sample.
CLO2	Experiment with the equipment used in water and air quality parameters tests and evaluate the obtained results with the standards.
CLO3	Comprehend and write useful reports, communicate through proper documentation and presentations.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1				√					√			
CLO2					√	√	√					
CLO3									√	√		

SN	COURSE CONTENT	Hrs	CLOs
1	Water sampling techniques; sample preservation	3.0	CLO1, CLO3
2	Physical, chemical and biological tests of water	9.0	CLO1, CLO2, CLO3
3	Break point chlorination and alum coagulation	5.5	CLO1, CLO2, CLO3
4	Sampling and laboratory analysis of air	2.0	CLO, CLO3

TEXTBOOK:

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time)

- Standard methods for the examination of water and wastewater, American Water Works Association (AWWA)/ American Public Health Association (APHA)/ Water Environment Federation (WEF) 20th edition.
- Environmental Conservation Rule-1997, Bangladesh Gazette, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.6.8. CE 3501

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3501 COURSE TITLE: Transportation Planning and Traffic Engineering		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the fundamentals of traffic, transportation engineering, and intelligent transportation system.
CLO2	Select the proper investigation technique and develop a solution for the road network-related challenges in Bangladesh.
CLO3	Apply analytical and mathematical knowledge to solve problems related to transportation planning, geometric design, and traffic engineering.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√		√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Transportation engineering, transportation functions; transportation systems, functional components, factors in transportation development	6.0	CLO1
2	Transportation modes, public transportation, emerging modes; intelligent transportation system: components and applications	7.0	CLO1
3	Transport planning: concepts, scope and hierarchy,	7.0	CLO1, CLO2,

SN	COURSE CONTENT	Hrs	CLOs
	process, goals and objectives, inventories, socio-economic activities, land use-transport interaction, travel demand forecasting; Road safety and accident analysis.		CLO3
4	Geometric design of highways: design controls and criteria, cross sectional elements, alignment, sight distance, intersection and interchange layouts, planning and design of bicycle and pedestrian facilities	8.0	CLO1, CLO3
5	Traffic engineering: fundamentals of traffic engineering, vehicle and traffic characteristics, traffic control devices and systems, traffic studies, planning and design of parking facilities, roadway lighting	6.0	CLO1, CLO3
6	Transportation in Bangladesh: transportation modes and networks, constraints and challenges, transport demand and modal share, road classification and design standards	5.0	CLO2

TEXTBOOK:

1. Highway Engineering, P. H. Wright and K. K. Dixon, 7th edition, Wiley (India) Pvt. Limited.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time)

1. Traffic Safety, L. Evans, 6th edition, Science Serving Society.
2. Traffic Engineering and Transportation Planning, D. L. R. Kadiyali, Khanna Publisher, India.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	50	50
Apply	30	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	40
Apply	40
Analyze	-
Evaluate	-

8.6.9. CE 3502

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 3502
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COURSE TITLE: Traffic Engineering Sessional		
CREDIT: 0.75 (Sessional)	TERMS OFFERED: 3 rd Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform field surveys on road condition, traffic flow, and capacity-related parameters.
CLO2	Perform hands-on experiments to design traffic signals and intersections using traffic flow and density data.
CLO3	Deliver quality reports on various traffic engineering-related parameters.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√			√								
CLO2			√		√							
CLO3									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Roadway traffic and capacity analysis	4.0	CLO1, CLO3
2	Signal design, road condition survey	4.0	CLO1, CLO2, CLO3
3	Road intersection design	2.5	CLO2, CLO3
4	Computer models and application packages	9.0	CLO1, CLO2, CLO3

TEXTBOOK:

1. Highway Engineering and Traffic Analysis, F. L. Mannering, S. S. Washburn and Walter P. Kilareski 4th edition, Wiley.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time)

1. Transportation Engineering Basics, A. S. N. Murthy and H. Mohle, 2nd edition, American Society of Civil Engineers.
2. Traffic Engineering and Transportation Planning, D. L. R. Kadiyali, Khanna Publisher, India.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
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Remember	10	10	20	20
Understand	30	30	50	40
Apply	30	35	20	40
Analyze	30	25	10	-
Evaluate	-	-		

8.7. 4th Year 1st Semester

8.7.1 HSS 4101

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: HSS 4101 COURSE TITLE: Bangladesh Studies and Government		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand and describe historical and developmental trends of Bangladesh from Ancient Bangladesh to the present.
CLO2	Understand the importance of social institutions, social systems as well as the forms and behavior of the government.
CLO3	Apply the principle of governance to assess the societal, cultural, legal, and political issues of a country in their professional life.
CLO4	Adopt a system or process that meet the public needs on contemporary issues and cultural, societal, administrative, and political concerns of Bangladesh.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1						√						
CLO2						√						
CLO3						√						
CLO4						√						

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to Bangladesh, history of Ancient Bengal;	3.0	CLO1
2	Origin and development of Bengal Civilization from early;	4.0	CLO1
3	Medieval periods to pre-Bangladesh period;	3.0	CLO1

SN	COURSE CONTENT	Hrs	CLOs
4	Background of Liberation War; Independence;	7.0	CLO1
5	Post-liberation periods for politico-cultural change and development.	3.0	CLO1
8	Basic concepts of government and politics: form and structure of government, organs of government-legislature, executive, judiciary, Democracy; Socialism, Capitalism, State, Nation and Nationality etc.	3.0	CLO2
9	Political views on government structure, form of government, organs characteristics and functions of Government, Good Governance, E-governance	4.0	CLO2
10	Local government, Public Administration in Bangladesh, Government and Politics of Bangladesh	3.0	CLO2
11	Constitution and laws for Government, Public principal, rule, policies, and law for Administration and Government	3.0	CLO3
12	Constitutional bodies, Central Government, Public Opinion and foreign policy of Bangladesh	3.0	CLO3, CLO4
13	Major Administrative Systems of Developed Counties	3.0	CLO4

TEXTBOOK:

1. Bangladesh Studies and Culture, Sumon Das and M.N. Mohabbat, Rodela Prokashani
2. The Future of Governing (Studies in Government and Public Policy), B. G. Peters, 2nd Edition, University Press of Kansas.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time)

1. A comprehensive Study on Bangladesh, M. N. Sultana and T. Islam, Prominence Publications.
2. Bangladesh Studies and Culture, Sumon Das and M.N. Mohabbat, Rodela Prokashani.
3. A comprehensive Study on Bangladesh, Mrs. Nasrin Sultana and Tauhidul Islam, Prominence Publications.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10

Understand	20
Apply	30
Analyze	25
Evaluate	10
Create	5

8.7.2. CE 4000

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4000 COURSE TITLE: Undergraduate Thesis		
CREDIT: 3.0 (Thesis)	SEMESTER OFFERED: 4 th Year 1 st and 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Identify all the developments in an area of research and find gaps in knowledge that need to be addressed.
CLO2	Define a research problem, formulate hypothesis, and deduct solutions.
CLO3	Design and analyze an experiment, and make conclusions, test the initial hypothesis of the problem considering ethical approach.
CLO4	Develop communication and presentation skills, both oral and written.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√	√									
CLO3			√	√	√							
CLO4									√	√		√

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	1 st semester: With the help of the supervisor, student should approach to conduct a literature review on a particular field among Structural Engineering, Concrete Technology, Environmental Engineering, Transportation Engineering, Water Resources Engineering and Geotechnical Engineering. On the basis of reviewed literatures, selecting a topic with the methodology to conduct the study, expected expenditure and time requirement should be finalized by the end of 1 st semester. The semester outcome will have to be defended through a	39.0	CLO1, CLO2

	presentation containing theoretical background, methodology, experimental plan, related expenditure, and a plan for the completion of the project/thesis at the end of the semester in a seminar organized by the Civil Engineering Department.		
2	2 nd semester: Students should conduct theoretical and/or analytical and/or experimental investigation of the selected topics in an individual or group study with the direct guidance of the supervisor appointed by the department. Students will be required to submit a thesis/project report and give a presentation of the same at the end of the work.	39.0	CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS: No particular reference book for this course.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.7.3. CE 4002

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4002 COURSE TITLE: Capstone Project		
CREDIT: 4.5 (Project)	SEMESTER OFFERED: 4 th Year 1 st and 2 nd Semester	
Exam Hours: NA	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Examine the impact of engineering solutions in a global, economic, environmental, and societal context.
CLO2	Work in groups, complete the design project, develop the documentation of the engineering project design.
CLO3	Design a real-life project system or process to meet desired needs within socioeconomic demand and ethical values.
CLO4	Communicate effectively in written, oral, graphical, and mathematical formats appropriate to civil engineering.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√	√									
CLO2									√		√	
CLO3			√		√			√				√
CLO4				√						√		√

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	1 st Semester: Total seven seminars demonstrating the issues of planning, analysis, design, preparation of drawing, bill of quantities (BoQ), and evaluation of contract of an integrated civil engineering project. Industrial attachment for two weeks will be accommodated in between two semesters comprising of field visits.	39.0	CLO1, CLO2, CLO4
2	2 nd semester: Students shall work in teams to apply civil engineering theories, methodologies, and skills to assess the technical, environmental, and social feasibility of the project, including design and cost estimation; student shall engage their diverse civil engineering and cross-disciplinary knowledge to prepare plans and specifications of the project including Bill of Quantity (BoQ), evaluation of contract and tender documents; students shall present their projects and submit project reports at the end of the semester and an extensive defense will have to be faced by the students in the presence of a group of experts including external examiners.	78.0	CLO2, CLO3, CLO4

TEXTBOOK:

REFERENCE BOOKS: No particular reference book for this course

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
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Remember	10
Understand	15
Apply	20
Analyze	20
Evaluate	35

8.7.4. CE 4003

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4003 COURSE TITLE: Project Planning and Construction Management		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the roles and responsibilities of a project planner and manager to promote and maintain good planning and control projects.
CLO2	Choose a project, create a breakdown of activities, and produce a plan and a schedule of resources requirements.
CLO3	Recommend proper planning and control techniques while understanding the limitations of their choice.
CLO4	Discover a proper decision-making process to justify alternatives for engineering economic analysis methods.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1						√				√	√	
CLO2	√	√									√	
CLO3						√				√		
CLO4	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Planning with bar charts and Gantt charts	01	CLO2
2	Use of modern tools for scheduling	02	CLO2
3	PERT and CPM	02	CLO3
4	Resource scheduling	01	CLO1
5	Linear programming and its application	02	CLO2
6	Principles of management	02	CLO1, CLO2
7	Construction organization and management	01	CLO1
8	Construction site and resource management	01	CLO3

SN	COURSE CONTENT	Hrs	CLOs
9	Construction methods, practices and technology	01	CLO3
10	Specifications, inspection and quality control	01	CLO3
11	Construction safety, economy and environmental regulations	01	CLO3
12	Demand forecasting	01	CLO3
13	Inventory control and stores management	01	CLO3
14	Procurement rules, regulations and law	01	CLO4
15	Procurement methods	01	CLO4
16	Tender documents and its preparation	01	CLO4
17	Tender evaluation and selection	01	CLO4
18	Contracts and agreements	01	CLO2, CLO3
19	Conflict management	01	CLO3
20	Psychology in administration and human resource management	01	CLO2
21	Project planning and evaluation	01	CLO3
22	Feasibility reports	02	CLO3
23	Cash flow methods of project evaluation	03	CLO3
24	Net present value and annual equivalent worth	03	CLO3
25	Internal rate of return	02	CLO3
26	Benefit-cost ratio and payback period	02	CLO3
27	Depreciation and replacement studies	02	CLO4

TEXTBOOK:

1. Professional Construction Management, D. S. Barrie and B. C. Paulson, 3rd edition, McGraw-Hill, New York.

REFERENCE BOOKS:

1. Operation Research, H. A. Taha, 10th edition, Pearson.
2. Project Management for Engineering and Construction, G. D. Oberlender, 3rd edition.
3. PERT and CPM-Principles and Application, L. S Srinath, 3rd edition, Affiliated East-West Press (Pvt.) Ltd.
4. Principles of Management, G. R. Terry, 4th edition, Richard D. Irwin.
5. Critical Path Methods in Construction Practice, j. M. Antill, and R. H. Woodhead, 4th edition, Wiley, New York.
6. Construction Management Fundamentals, J. S. Clifford and M. Richard, 2nd edition, McGraw Hill, Singapore.
7. Engineering Economy, B. Leland and T. Anthony, 7th edition, McGraw-Hill, New York.
8. Engineering Economy, G. J. Thuesen and W. J. Fabrycky, 8th edition, Prentice-Hall, Eaglewood Cliffs.
9. Engineering Project Management, N. Smith, Blackwell Science, Oxford.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (Marks 210) (%)
Remember	10
Understand	15
Apply	20
Analyze	20
Evaluate	35

8.7.5. CE 4102

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4102 COURSE TITLE: Building Design Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: NA	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Apply the knowledge and select appropriate structural systems following the code requirements for low- and high-rise buildings.
CLO2	Calculate accurate loads and their combination for a building and water reservoir design.
CLO3	Analyze and design low- and high-rise buildings manually, incorporating structural analysis and design software in the real field.
CLO4	Analyze and design a water reservoir manually and use structural analysis and design software in the real field.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3		√	√									
CLO4		√	√									

(Tick mark or level of correlation: 3-High, 2-Medium, 1-Low can be used)

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Design codes and their requirements for building and	12.0	CLO1

	water reservoir analysis and design.		
2	Structural system of low-rise and high-rise building and its behavior.	8.0	CLO1, CLO2
3	Analyzing and designing approaches for a building along with using structural analysis and design software.	10.0	CLO1, CLO2, CLO3
4	Design a building and water reservoir to fulfill the code requirements and drawing all components of the building.	9.0	CLO1, CLO2, CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Bangladesh National Building Code (BNBC).
2. Elementary Structural Analysis and Design of Buildings, D. R. Pilla, 1st edition, CRC Press.
3. Structural design of buildings, P. Smith, 1st edition, Wiley-Blackwell.
4. Comprehensive RCC Designs, D. B.C. Punmia, A. K. Jain and A. K. Jain, 3rd edition.
5. ETABS 2016 Black Book, G. Verma, 1st edition, CAD/CAM/CAE Works.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.7.6. CE 4201

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4201 COURSE TITLE: Irrigation and Flood Management		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand and determine the water requirements of crops and choose the proper irrigation technique in the practical field.
CLO2	Design the pumps, wells, and canals (irrigation & drainage) for proper irrigation management.

CLO3	Select and design suitable river training works based on channel characteristics.
CLO4	Recommend the suitable measures for flood control from the engineering point of view.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√	√									
CLO2		√	√									
CLO3			√				√					
CLO4			√				√					

Alignment of Topics of the Course with Contact Hours and CLOs

	COURSE CONTENT	Hrs	CLOs
1	Importance of irrigation, sources and quality of irrigation water, water rights, irrigation status and crop pattern in Bangladesh	4.0	CLO1
2	Soil-water-crop relationship, consumptive use of water, water requirements and irrigation scheduling	5.0	CLO1
3	Methods of irrigation, irrigation efficiencies, irrigation canal system, field-irrigation structures	5.0	CLO1, CLO2
4	Irrigation pumps and design of wells, irrigation projects and institutional constraints	6.0	CLO1, CLO2
5	Problems of irrigated lands, waterlogging and drainage of irrigated lands	4.0	CLO2
6	Types of canal linings and design of lined canals	4.0	CLO1, CLO2
7	River channel pattern and characteristics, methods of river training and design, dredging	6.0	CLO1, CLO2
8	Types and causes of flood, flood risk and vulnerability analysis, methods of flood management, economic aspects of flood management	5.0	CLO3

TEXTBOOK:

1. Irrigation Engineering & Hydraulic Structures, S. K. Garg, Khanna Publishers, Delhi.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Irrigation and Water Resources Engineering, G. L. Asawa, New Age International Publishers.
2. Flood Control and Drainage Engineering, S. N. Ghosh, 4th edition, CRC Press.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50

Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	10
Apply	25
Analyze	25
Evaluate	20
Create	10

8.7.7. CE 4401

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4401 COURSE TITLE: Environmental Engineering-II		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand wastewater and sewage collection system, sanitation, health, hygiene, sustainability of water and sanitation services
CLO2	Choose suitable low-cost sanitation technology
CLO3	Analyze and design plumbing system, sewer and storm drainage system, and wastewater treatment units/processes

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√						√					
CLO2		√				√						
CLO3	√		√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Wastewater Engineering: introduction; estimation of wastewater; wastewater collection system	5.0	CLO1
2	Hydraulics of sewer design; construction and maintenance of sanitary sewer and storm drainage system	5.0	CLO3

SN	COURSE CONTENT	Hrs	CLOs
3	Sewer appurtenance; plumbing system.	3.0	CLO1, CLO3
4	Microbiology of wastewater; wastewater characteristics	4.0	CLO1
5	Wastewater treatment and disposal	5.0	CLO3
6	Treatment and disposal of industrial effluents; sludge treatment and disposal	4.0	CLO3
7	Sanitation, health and hygiene	3.0	CLO1
8	Low-cost sanitation technology; septic tank system.	3.0	CLO2
9	Sustainability of water and sanitation services	3.0	CLO1
10	Participatory development approach in water and sanitation sector; community management of water and sanitation services	4.0	CLO1

TEXTBOOK:

1. Water and Environmental Engineering, M. H. Rahman and A. A. Mueyed, 1st edition, ITN, BUET.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time.)

1. Water Supply and Sanitation for rural and low-income urban communities, M. F. Ahmed and M. M. Rahman, 1st edition, ITN, BUET.
2. Environmental Engineering, H. S. Peavy and D. R. Rowe, G. Tchobanoglous, 1st edition, McGraw Hill, India.
3. Wastewater Engineering Treatment Disposal Reuse, Metkalf and Eddy, 2nd edition, McGraw-Hill.
4. Sewage Treatment for hot climate, D. Mara, 1st edition, Wiley.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	50	50
Apply	30	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	35
Analyze	35
Evaluate	-

8.7.8. CE 4402

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4402 COURSE TITLE: Environmental Engineering-II Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Apply the acquired knowledge and techniques to wastewater, solid waste, and soil sampling and preserving the water sample.
CLO2	Examine the wastewater quality parameters and analyze the soil and solid waste samples in the laboratory environment and compare the obtained results with the standards.
CLO3	Comprehend and write effective reports, communicate through proper documentation and presentations.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1									√	√		
CLO2									√	√		
CLO3									√	√		

(Tick mark or level of correlation: 3-High, 2-Medium, 1-Low can be used)

SN	COURSE CONTENT	Hrs	CLOs
1	Wastewater sampling techniques; sample preservation	4.0	CLO1, CLO3
2	Physical, chemical and biological tests of wastewater	11.0	CLO1, CLO2, CLO3
3	Sampling and laboratory analysis of soil and solid waste	4.0	CLO1, CLO2, CLO3

TEXTBOOK:

- Standard methods for the examination of water and wastewater, 20th edition, American Water Works Association (AWWA)/ American Public Health Association (APHA)/ Water Environment Federation (WEF).

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

- Environmental Conservation Rule-1997, Bangladesh Gazette, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh.

ASSESSMENT PATTERN

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.7.9. CE 4501

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4501 COURSE TITLE: Pavement Design and Railway Engineering		
CREDIT: 4.0 (Theory)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the fundamentals of construction procedures and materials of various pavements.
CLO2	Recognize the existing technology for the operation and maintenance of railway physical infrastructure.
CLO3	Analyze and design the flexible and rigid pavement by different methods.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√			√								
CLO2	√			√								
CLO3	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Pavement materials: Bituminous binders, cement	4.0	CLO1
2	Aggregates, embankment material	4.0	CLO1
3	Mix design methods	3.0	CLO3
4	Soil stabilization, Low-cost roads, Pavement components and functions	5.0	CLO1
5	Pavement design and construction, Road maintenance	10.0	CLO1, CLO3

SN	COURSE CONTENT	Hrs	CLOs
6	Railway Engineering: General requirements, rolling stock and tracks	13.0	CLO2
7	Stations and yards, points and crossings, signalling, maintenance operations; introduction to modern, urban and sub-urban railways.	13.0	CLO2

TEXTBOOK:

1. Principle of Pavement Design, E. J. Yoder and M. W. Witczak, 2nd Edition, A Wiley-Inter-science Publication, John Wiley & Sons Inc., New York.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. A Textbook of Transportation Engineering, S. P. Chandola, 1st edition, S. Chand & Company Ltd, New Delhi.
2. Transportation Engineering- I, T. V. Mathew, Transportation Systems Engineering, Civil Engineering Department Indian Institute of Technology Bombay, Powai, India.
3. Highway Engineering, G. Singh and J. Singh, Standard Publishers Distributors, Delhi.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	30
Apply	20
Analyze	30
Evaluate	-

8.7.10. CE 4502

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4502 COURSE TITLE: Highway Materials Sessional		
CREDIT: 0.75 (Sessional)	SEMESTER OFFERED: 4 th Year 1 st Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform laboratory tests on aggregates and bituminous materials and select the appropriate materials for different pavement layers.
CLO2	Perform hands-on experiments to design the asphalt concrete mixture.
CLO3	Deliver quality reports on various construction materials and work on the quality and control of materials.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√								√			
CLO2		√	√									
CLO3									√	√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Tests on sub-grade, sub-base and base materials	7.5	CLO1, CLO3
2	Tests on bituminous materials	6.0	CLO1, CLO3
3	Bituminous mix design	6.0	CLO2, CLO3

TEXTBOOK:

1. Principle of Pavement Design, E. J. Yoder and M. W. Witczak, 2nd Edition, A Wiley-Inter-science Publication, John Wiley & Sons Inc., New York.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. A Textbook of Transportation Engineering, S. P. Chandola, 1st edition, S. Chand & Company Ltd, New Delhi.
2. Transportation Engineering- I, T. V. Mathew, Transportation Systems Engineering, Civil Engineering Department Indian Institute of Technology Bombay, Powai, India.
3. Highway Engineering, G. Singh and J. Singh, Standard Publishers Distributors, Delhi.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	30	50	30
Apply	40	35	20	30
Analyze	30	25	10	20
Evaluate	-	-	-	

8.8. 4th Year 2nd Semester

8.8.1. CE 4000 (provided in 4th Year 1st Semester)

8.8.2. CE 4002 (provided in 4th Year 1st Semester)

8.8.3 (a). CE 4005

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4005 COURSE TITLE: Sustainability of Development Projects		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Outline concepts, characteristics, and components of a sustainable development project.
CLO2	Apply the strategies to achieve sustainable development goals.
CLO3	Analyze development, economic growth, and socio-economic indicators.
CLO4	Propose appropriate social impact assessment technique and resettlement action plan to adopt various strategies to implement the community participation in a development project successfully.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1							√				√	
CLO2			√				√					√
CLO3						√						
CLO4						√	√				√	

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Concept and significance of sustainability of a development project; dimensions, characteristics and management of development projects;	04	CLO1
2	Sustainable development goals (SDGs); pillars of sustainable development; threats to sustainability; issues of environmental sustainability; indicators and assessment for the sustainability of environment;	04	CLO1
3	Evaluation of sustainability of development projects; decision-making criteria;	04	CLO2
4	Project planning: basic concept, project proposal and site selection, challenges, design, environmental considerations	05	CLO1; CLO2

SN	COURSE CONTENT	Hrs	CLOs
	and sustainable solution.		
5	Socio-economic aspects of the development project; economic and social structure; development and economic growth; socio-economic indicators.	08	CLO3
6	Population displacement, resettlement, rehabilitation strategy and resettlement action plan (RAP).	04	CLO4
7	Socio-economic impact assessment approach; socio-economic survey and case studies; social impact assessment (SIA) in development project	06	CLO4
8	Legal aspects and procedure to develop SIA and RAP	04	CLO4

TEXTBOOK:

REFERENCE BOOKS:

1. Sustainable Development Projects: Integrated Design, Development, and Regulation, D. R. Godschalk, and E. E. Malizia, 1st edition, Routledge.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination (Marks: 210)

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	30
Analyze	30
Evaluate	15

8.8.3 (b). CE 4007

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4007 COURSE TITLE: Principles of Project Finance		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the main concepts of project finance, including funding sources, financial structure, and models.
CLO2	Select appropriate methods of finance.
CLO3	Analyze project-financial risk.
CLO4	Develop project-finance loan documentation, contracts, and financing agreements.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1											√	√
CLO2											√	√
CLO3				√							√	
CLO4									√	√	√	

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to projects, management and its finance.	3.0	CLO1
2	Sources of project-finance and its market	3.0	CLO1
3	Financial structure and models	3.0	CLO1
4	Principles of project financing, global project-finance overview	4.0	CLO1
5	Stakeholders in project finance, stakeholder roles	3.0	CLO2
6	Dealing with lenders and investors, sponsor perspectives-structuring and documentation	3.0	CLO3
7	Privately financed projects, public-private partnerships, export-credit agencies and development-finance institutions	4.0	CLO3
8	Risk and risk allocation, categories of risk allocation, macro-economic risks, regulatory and political risks, commercial risks	5.0	CLO4
9	Project-finance risk assessment, completion risks and government perspectives, risks evaluation and returns on a project	6.0	CLO4
10	Contract parties and sub-contracts, contracts and financing agreements, project-finance loan documentation, typical commercial contracts and their effects on project-finance structures.	5.0	CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Principles of Project Finance, E. R. Yescombe, 2nd edition, Elsevier.

2. Public-private Partnerships: Principles of Policy and Finance, E. R. Yescombe, 1st edition, Elsevier.
3. Project Finance in Theory and Practice, by S. Gatti, 2nd edition, Academic Press.
4. Project Financing: Asset-based Financial Engineering, J. D. Finnerty, 3rd edition, Wiley.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	20
Analyze	20
Evaluate	35

8.8.3 (c). CE 4009

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4009 COURSE TITLE: Business and Career Development		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Apply proper motivation strategies for the workforce, communicate effectively in a professional environment and evaluate appraisal for compensation and benefits of employees.
CLO2	Demonstrate segmentation and market analysis by selecting proper marketing strategy and marketing tools.
CLO3	Make decisions of appropriate operations process for quality production and implementation.
CLO4	Select appropriate career and apply knowledge for development.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1									√	√		
CLO2										√	√	
CLO3								√	√		√	
CLO4					√			√				

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to business and types of business	3.0	CLO1
2	Techniques of effective communication in professional environment	3.0	CLO1, CLO3
3	Writing techniques of modern business letters, memos and reports	3.0	CLO1, CLO3
4	Human resource management: source of manpower	3.0	CLO2, CLO3
5	Methods of selection and recruitment	3.0	CLO2
6	Development and motivating the workforce	3.0	CLO3
7	Appraisal procedures, employee compensation and benefits	3.0	CLO4
8	Concepts and ways of career development	3.0	CLO4
9	Basic marketing management, Segmentation, and market analysis	3.0	CLO3, CLO4
10	Marketing strategies and use of marketing tools	3.0	CLO3, CLO4
11	Branding, choosing brand elements, brand extension and its advantages and disadvantages	3.0	CLO3, CLO4
12	Introduction to operations management	3.0	CLO4
13	Basic production decisions of an organization, quality control within operations process	3.0	CLO4

TEXTBOOK:

1. Introduction to Business, Student Edition (BROWN: INTRO TO BUSINESS), 1st Edition, McGraw-Hill Companies.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Fundamentals of Human Resource Management, A. Noe, J. Hollenbeck, B. Gerhart and P. Wright, 8th edition, The McGraw-Hill Companies Inc., New York.
2. Career Planning, Development, and Management, J. P. West, 1st edition, Routledge.
3. Small Business, Entrepreneurship & Enterprise Development, G. Beaver, Financial Times Management.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50

Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	20
Analyze	20
Evaluate	35

8.8.4. CE 4011

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4011 COURSE TITLE: Professional Practice, Communication and Ethics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the development of a project, its characteristic features considering project life cycle; and related code of practices i.e., BNBC, ECR, NWP, and WSP.
CLO2	Apply ethical practices as an integral part of the code of conduct in professional life.
CLO3	Make distinctions between competing choices and take consequences into account when making ethical decisions.
CLO4	Apply plagiarism issues in code of conduct, research, and writing.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1			√	√								
CLO2								√				
CLO3							√	√				
CLO4						√		√		√		

Alignment of Topics of the Course with Contact Hours and CLOs

SN	Course Content/Topic	Hrs	CLOs
1	Project, its characteristic feature, project life cycle;	3.0	CLO1,
2	Code of practices: BNBC, ECR, NWP; WSP;	3.0	CLO1
3	Nirman Bidhimala; procurement regulations and law: PPA	3.0	CLO1

SN	Course Content/Topic	Hrs	CLOs
	2008, PPR 2010;		
4	Type of contracts; documents for procurement of works, goods and services and their application;	3.0	CLO3
5	Contract risk and contract responsibility; insurances;	2.0	CLO3
6	Tender procedure; claims, disputes and arbitration procedure; measures for reducing fiduciary risks.	3.0	CLO3
7	Introduction to communication concepts; modes of communication; methods of effective communication;	3.0	CLO4
8	Writing reports; oral presentation of reports; writing proposals; preparing effective business messages;	4.0	CLO4
9	Conducting meetings; strategies for effective speaking and successful inter personal communication;	2.0	CLO4
10	Job application process, interviews and follow-ups;	2.0	CLO4
11	Introduction and codes of ethics for engineers; the ethical issues involved in conducting professional practice; ethical expectations;	3.0	CLO2
12	Employers and employees, inter-professional relationship;	2.0	CLO2
13	Ethical conduct related to research, literature citation, writing and plagiarism issues;	3.0	CLO3
14	Ethical problem-solving using case studies in civil engineering problems.	3.0	CLO3

TEXTBOOK:

1. Introduction to Engineering Ethics, R. Schinzinger and M. W. Martin, 3rd Edition, McGraw-Hill Higher Education.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Fundamentals of Ethics for Scientists and Engineers, E. G. Seebauer and R. L. Barry, 1st Edition, Oxford University Press.
2. Engineering Ethics: Cases and Concepts, R. Harris and Pritchard, 3rd Edition, Wadsworth.
3. Engineering Ethics: Balancing Cost, Schedule, and Risk; Lesson Learned from the Space Shuttle, R. L. B. Pinkus, L. J. Shuman, N. P. Hummon, and H. Wolfe, Cambridge University Press.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	20
Analyze	20
Evaluate	35

8.8.5. CE 4012

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4012 COURSE TITLE: Professional Practice and Communication Sessional		
CREDIT: 1.5 (Sessional)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: N/A	CIE Marks: 100%	SEE Marks: 00%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Assess effective technical and professional documents.
CLO2	Plan , draft, revise, and edit technical and professional documents individually and collaborate with a team.
CLO3	Apply principles for the visual display of quantitative information.
CLO4	Understand ethical implications of technical communication in professional contexts.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1										√		
CLO2						√				√		
CLO3					√				√	√		
CLO4								√		√		√

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Application of communication theory and professional practice approaches in a controlled classroom environment;	9	CLO1
2	Introduction to communication and report writing;	10	CLO2
3	Components and preparation of technical reports and proposals;	10	CLO3
4	Case study analysis; classroom presentations on individual technical reports and proposals.	10	CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Professional Report Writing, S. Mort, 1st edition, Routledge.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Assignment (Class and Home) / Report (%)	Quiz (%)	Board Viva (%)	In class Participation (%)
Remember	10	10	20	20
Understand	20	20	50	30
Apply	30	35	20	30
Analyze	30	25	10	20
Evaluate	10	10		

8.8.6. Optional Course I (See Optional Courses)

8.8.7. Optional Course II (See Optional Courses)

8.8.8. Optional Course III (See Optional Courses)

8.9. Optional Courses

8.9.1. CE 4103

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4103 COURSE TITLE: Prestressed Concrete		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand properties of materials for prestressed concrete (PC), principles of PC, prestressing system, anchorage systems, loss of prestress and partial prestress.
CLO2	Calculate the loss of prestress, deflections of PC beam section.
CLO3	Analyze and design simple and continuous PC beam for flexure, bond, shear, bearing and end block.
CLO4	Design of prestressed pipes, piles, poles, and railway sleepers.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3		√	√									

CLO4		√	√									
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Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Prestressed concrete members and materials; prestressing system; anchorage systems; partial prestress;	3.0	CLO1
	Loss of prestress;	2.0	CLO2
	Beam deflections; cable layout;	2.0	CLO2
	Analysis of sections for flexure, shear, bond and bearing; analysis of end block and composite sections;	6.0	CLO3
2	Design of prestressed concrete beams for simple and continuous spans;	6.0	CLO4
	Design considerations for prestressed concrete pipes, piles, poles, and railway sleepers.	7.0	CLO4

TEXTBOOK:

1. Design of Prestressed Concrete Structures, T.Y. Lin and A. P. Burns, 3rd edition, John Wiley & Sons, Inc., Hoboken, New Jersey.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Prestressed Concrete, N. Rajagopalan, Alpha Science International Ltd., Pangbourne, UK.
2. Design of Concrete Structures, D. Darwin and C.W. Dolan, 16th edition, McGraw Hill Companies Inc., New York.
3. Design of Concrete Structures, A.H. Nilson, D. Darwin and C.W. Dolan, 14th edition, McGraw Hill Companies Inc., New York.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	20	50
Apply	30	-
Analyze	30	-
Evaluate		
Create		

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	30

Analyze	30
Evaluate	10
Create	

8.9.2. CE 4105

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4105 COURSE TITLE: Introduction to Steel-Concrete Composite Structures		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the fundamental concepts and principles of composite structures, specifically the steel-concrete composite structures
CLO2	Design composite beams, columns, and floor systems.
CLO3	Optimize design solution for steel-concrete composite beams and columns.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√	√									
CLO3		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to steel-concrete composite structures; review of the properties of materials: structural steel, profiled steel, reinforcing steel and concrete; basic concepts and design criteria of composite structure, shear connectors, bond-slip effect; design of composite columns, beams, analysis, and design of composite floors.	26.0	CLO1, CLO2, CLO3

TEXTBOOK:

1. Steel Design, W. T. Segui, 5th Edition, Cengage Learning.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Steel Structures Design (ASD/LRFD), A. Williams, McGraw Hill.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	20	50
Apply	40	-
Analyze	30	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	30
Analyze	25
Evaluate	20

8.9.3. CE 4107

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4107 COURSE TITLE: Design of Concrete Structures III		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Differentiate joist slabs from other types of slabs; design joist slabs with or without beam on the column line.
CLO2	Design and detail RC beam-column joints, shear wall, lift cores, and diaphragm.
CLO3	Select appropriate stair types for a specific job and perform analysis and design of different types of stairs.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√	√									
CLO2		√	√									
CLO3		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Design of one-way and two-way joist slabs with or without beam on the column line; design and detailing of lateral load resisting RC members: shear wall, lift cores,	13.0	CLO1, CLO2

SN	COURSE CONTENT	Hrs	CLOs
	diaphragm etc.		
2	Design of reinforcement at RC beam-column joint; design of different types of RC stairs.	13.0	CLO2, CLO3

TEXTBOOK:

1. Design of Concrete Structures, D. Darwin and C.W. Dolan, 16th Edition, McGraw Hill Companies Inc., New York.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Structural Concrete, by M. N. Hassoun and A. Al-Manaseer, 6th Edition, John Wiley & Sons, Inc., Hoboken, New Jersey.
2. Practical Design of Reinforced Concrete Buildings, S. M. Ashraf, 1st Edition CRC Press, USA.
3. The Analysis of Irregular Shaped Structures Diaphragms and Shear Walls, by R. T. Malone, R. Rice, 1st Edition, McGraw-Hill Professional, USA.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	20	50
Apply	40	-
Analyze	30	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	30
Analyze	25
Evaluate	15

8.9.4. CE 4109

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4109 COURSE TITLE: Introduction to Finite Element Method		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the fundamental of Finite Element Analysis, element types, element shapes, nodes, nodal unknowns and coordinate systems, shape functions, strain displacement matrix.
CLO2	Assemble stiffness equations considering Galerkin's method, virtual work and principle of minimum potential energy.
CLO3	Use the numerical integration technique in solving analytical problems.
CLO4	Relate finite element method in software development viz. ETABS, STAAD Pro. etc.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4	√			√								

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to finite element method as applied to stress analysis problems; basic equations in elasticity, matrix displacement formulation, element shapes, nodes, nodal unknowns and coordinate system, shape functions, strain displacement matrix, methods for assembling stiffness equations, e.g., direct approach, Galerkin's method, virtual work method, the principle of minimum potential energy.	13.0	CLO1, CLO2, CLO3
2	Introduction to isoparametric formulation; discretization of a structure and mesh refinement, one dimensional stress-deformation and two-dimensional plane stress and plane strain analysis of stress-deformation problems; numerical integration and computer application.	13.0	CLO3, CLO4

TEXTBOOK:

1. Finite Element Analysis - Theory and Programming, C. S. Krishnamoorthy, 2nd edition, McGraw-Hill Inc., USA.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. The Finite Element Methods - Linear, Static and Dynamic Element Analysis, T. J. R. Hugh, 1st edition, Dover Publications, Inc.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50

Understand	20	50
Apply	40	-
Analyze	30	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	10
Apply	40
Analyze	30

8.9.5. CE 4111

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4111 COURSE TITLE: Structural Dynamics		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the fundamental principles of Dynamics; identify single degrees of freedom (SDOF) and multi-degrees of freedom (MDOF) system.
CLO2	Calculate dynamic loads on different types of structures.
CLO3	Formulate equation of motion under free and forced vibration for SDOF and MDOF systems, and determine the natural frequency, formulate stiffness matrix, mass matrix.
CLO4	Evaluate the dynamic response of an SDOF under harmonic and impulse loading; Analyze an MDOF system under harmonic.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√	√										
CLO3	√	√										
CLO4	√	√										

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction and importance of structural dynamics; formulation of equation of motion; free vibration response; single degree of freedom (SDOF) systems; response to harmonic and impulse loading and vibration analysis by Rayleigh's method, response spectrum; and	26.0	CLO1, CLO2, CLO3, CLO4

SN	COURSE CONTENT	Hrs	CLOs
	multi-degree of freedom (MDOF); generalized Eigen value problems; modal super position; frequencies and mode shapes.		

TEXTBOOK:

1. Dynamics of Structures, Theory and Applications to Earthquake Engineering, A. K. Chopra, 3rd edition, Prentice-Hall.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

2. Dynamics of Structures, R. W. Clough and J. Penzien, Computers & Structures, Inc..

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	10	50
Understand	30	50
Apply	40	-
Analyze	20	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	10
Apply	40
Analyze	30

8.9.6. CE 4203

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4203 COURSE TITLE: Hydraulic Structures		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Perform the hydraulic design of gravity dam, weir, barrage, spillway, cross-drainage works, reservoir, etc.
CLO2	Check the stability of hydraulic structures and identify the causes of failure.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√	√									
CLO2		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Types and design principles of hydraulic structures; Design of weirs, barrages and cross-drainage works.	13.0	CLO1, CLO2
2	Dams and reservoirs: types, site selection, and design, stability analysis of gravity dams; Design of spillways, energy dissipaters, spillway gates.	13.0	CLO1, CLO2

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Irrigation Engineering and Hydraulic Structures, S. K. Garg, Khanna Publishers. India

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	10
Apply	20
Analyze	20
Evaluate	20
Create	20

8.9.7. CE 4205

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4205 COURSE TITLE: River Engineering	
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester

Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%
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Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the behavior of alluvial rivers, morphological processes and sediment movement.
CLO2	Assess the channel instability and bed forms.
CLO3	Design the river training and bank protection works.
CLO4	Apply the knowledge to choose dredging techniques to maintain navigable channels.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√											
CLO2		√		√								
CLO3		√	√									
CLO4				√			√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Behavior of alluvial rivers	2.0	CLO1
2	River-channel pattern and fluvial process	3.0	CLO1
3	Sediment movement in river channels	4.0	CLO1, CLO2
4	Bed forms and flow regimes	3.0	CLO1, CLO2
5	Aggradation and degradation	2.0	CLO2
6	Local scour	3.0	CLO1, CLO2
7	Design of river training and bank protection works	6.0	CLO1, CLO3
8	Navigation and dredging	3.0	CLO4

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. River Engineering, M. S. Peterson, Prentice Hall.
2. River Engineering, K. D. Gupta, 1st edition, Vayu Education of India.
3. River Mechanics, P. Y. Julien, 1st edition, Cambridge University Press.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-
Create	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	15
Apply	20
Analyze	20
Evaluate	25
Create	10

8.9.8. CE 4207

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4207 COURSE TITLE: Coastal Engineering		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Calculate the magnitude and direction of wave forces and carry out analysis of wave data to determine long-term design statistics.
CLO2	Understand the phenomena of tides, delta and estuary processes and how they influence coastal sites.
CLO3	Estimate tidal flow and sediment transportation.
CLO4	Select suitable structures for shore protection based on different conditions.
CLO5	Determine design load on the coastal structure and undertake a design of a coastal structure.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2	√											
CLO3	√	√										
CLO4		√		√								

CLO5		√	√									
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Alignment of Topics of the Course with Contact Hours and CLOs

	COURSE CONTENT	Hrs	CLOs
1	Coast and coastal features; coastal zone of Bangladesh; tides and currents; waves and its characteristics; forces of waves and tides in the design of coastal and harbor structures.	13.0	CLO1, CLO2
2	Coastal sedimentation processes; deltas and estuary; docks and harbors; shore protection works.	13.0	CLO3, CLO4, CLO5

TEXTBOOK:

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Coastal Hydrodynamics, J. S. Mani, PHI Pvt. Ltd. New Delhi.
2. Water wave mechanics for Engineers and Scientists, R.G. Dean, and R.A. Dalrymple, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
3. Estuary and Coastline Hydrodynamics, A.T. Ippen, 1st edition, McGraw-Hill, Inc., New York.
4. Basic Coastal Engineering, 3rd edition, R.M. Sorenson, A. Wiley-Interscience Pub. New York.
5. Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC.

ASSESSMENT PATTERN

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	30
Apply	20
Analyze	20
Evaluate	20

8.9.9. CE 4301

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4301 COURSE TITLE: Earth Retaining Structures		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 2.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Analyze and design foundations subjected to lateral loads.
CLO2	Select technically appropriate and cost-effective Earth Retaining Structures.
CLO3	Describe construction and inspection activities for Earth Retaining Structures.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√	√									
CLO2				√		√						
CLO3						√					√	

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to earth retaining structures	2.0	CLO1
2	Design of foundations subjected to lateral loads	8.0	CLO1
3	Design of rigid and flexible earth retaining structures	12.0	CLO1, CLO2
4	Methods of construction of earth retaining structures	4.0	CLO3

TEXTBOOK:

1. Foundation Engineering handbook, H. F. Winterkorn and H. Y. Fand, Galgotia.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Foundation Engineering handbook, H. F. Winterkorn and H. Y. Fand, Galgotia.
2. Earth Pressure and Earth Retaining Structures, C.R. Clayton, I. Militisky, and J. Woods, "Survey university press.
3. Principles of Foundation Engineering, B. M. Das, CL Engineering.
4. Fundamentals of Geotechnical Engineering, B. M. Das, CL Engineering.
5. Analysis and Design of Foundations and Retaining Structures, S. Saran, IK International Publishing.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	20
Analyze	25
Evaluate	20
Create	15

8.9.10. CE 4303

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4303 COURSE TITLE: Elementary Soil Dynamics		
CREDIT: 3.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 2.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Interpret dynamic properties of soil to conduct a systematic analysis of foundations under vibratory loading.
CLO2	Design various geotechnical structures considering dynamic loadings.
CLO3	Estimate the seismic vulnerability of a site and suggest necessary remedial measures.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		√		√								
CLO2		√	√									
CLO3		√				√						

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Elementary vibrations and dynamic properties of soil	8.0	CLO1
2	Seismic response of soils: site effects, site amplification	4.0	CLO3

SN	COURSE CONTENT	Hrs	CLOs
3	Design of foundations for dynamic loads	9.0	CLO2
4	Liquefaction problems, remedial measures, and earthquake hazards	5.0	CLO3

TEXTBOOK:

1. Principles of Soil Dynamics, B. M. Das, PWS-KENT Publishing Company.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Principles of Soil Dynamics, B. M. Das, PWS-KENT Publishing Company.
2. Geotechnical Earthquake Engineering, S. L. Kramer, Prentice Hall Inc.
3. Dynamics of Bases and Foundations, D. D. Barkan, McGraw-Hill Book Company.
4. Vibrations of Soils and Foundations, E. E. Richart, Prentice Hall Inc.
5. Soil Dynamics T. H. Wu, Allyn and Bacon Inc.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	20
Analyze	25
Evaluate	10
Create	15

8.9.11. CE 4305

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4305 COURSE TITLE: Earth Dams and Stability of Slopes		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Describe the behavior of natural and engineered earthen slopes and excavations
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	under various weather and engineering conditions.
CLO2	Explain the factors such as seepage, earthquake that may affect the stability of slopes.
CLO3	Select an appropriate slope stability analysis method subject to the geometry of slope, material properties, and uncertainty of observations.
CLO4	Assess the potential landslide risk of slopes and suggest necessary remedial measures.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√	√										
CLO2		√		√								
CLO3		√	√									
CLO4			√	√								

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Introduction to soil-water interaction problems	2.0	CLO2
2	Permeability, capillarity and soil suction; Seepage analysis	5.0	CLO1, CLO2
3	Stability of slopes and excavations subjected to seepage, water current, wave action etc.	10.0	CLO1, CLO3, CLO4
4	Theories of filters and revetment design	5.0	CLO4
5	Geotechnical design of landfills	4.0	CLO4

TEXTBOOK:

1. Slope Stability and Stabilization Methods, L.W. Abramson, T. S. Lee, S. Sharma and G. M. Boyce, Wiley & Sons Inc.

REFERENCE BOOKS: (List of the references books may vary depending upon the choice of course teachers and time)

1. Slope Stability and Stabilization Methods, L.W. Abramson, T. S. Lee, S. Sharma and G. M. Boyce, Wiley & Sons Inc.
2. Soil Strength and Slope Stability, J. M. Duncan and S. G. Wright, John Wiley & Sons.
3. Earth and Rockfill Dam Engineering, G. F. Sowers and H. L. Sally, Asia Publishing House.
4. Earth and Rockfill Dams, G. F. Sowers, and H. I. Salley, R.C. Williams and T. S. Wallace.
5. Slope Stability and Stabilization methods, L. W. Abramson, T. S. Lee and S. Sharma, John Wiley & sons.
6. The Stability of Slopes, E. N. Bromhead, Blackie academic and professional, London.
7. Earth & Rockfill Dams: Principles of Design and Construction, Christian, Kutzner Published Oxford and IBH.

ASSESSMENT PATTERN:**CIE- Continuous Internal Evaluation**

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	05
Understand	15
Apply	10
Analyze	35
Evaluate	35

8.9.12. CE 4403

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4403 COURSE TITLE: Solid Waste Management		
CREDIT: 2.0 (Optional)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand solid and hazardous waste characteristics and the regulatory requirements regarding solid and hazardous waste management.
CLO2	Analyze the contemporary waste minimization techniques and design storage, collection, transport, processing and disposal of solid and hazardous waste.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1						√	√					
CLO2						√	√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Sources and types of solid wastes	2.0	CLO1
2	Physical, chemical and biological properties of solid	2.0	CLO1

SN	COURSE CONTENT	Hrs	CLOs
	wastes		
3	Solid waste generation; on-site handling, storage and processing	2.0	CLO1, CLO2
4	collection of solid wastes; transfer stations and transport; ultimate disposal methods;	2.0	CLO1, CLO2
5	Composting, resources and energy recovery and recycling; Soil pollution	3.0	CLO2
6	Industrial solid waste collection and disposal	2.0	CLO1, CLO2
7	Hazardous Waste Management: identification, sources and characteristics of hazardous wastes	3.0	CLO1, CLO2
8	Hospital waste management practices; legal aspects; auditing and prevention	2.0	CLO1, CLO2
9	Methods of treatment and disposal – physical, chemical, biological and thermal treatment	2.0	CLO2
10	Stabilization and solidification, engineering storage	2.0	CLO2
11	Incineration, landfill and deep burial	2.0	CLO2

TEXTBOOK:

1. Solid and Hazardous Waste Management- M. H. Rahman and A. Al-Muyeed, 1st edition, ITN, BUET.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time.)

1. Water supply and sanitation, M. F. Ahmed and M. M. Rahman, 1st edition, ITN, BUET.
2. Environmental Engineering. H. S. Peavy, D. R. Rowe and Geroge Tchobanoglous, 1st edition, Mc Graw Hill India.
3. Water and Environmental Engineering-M. H. Rahman and A. Al Muyeed. 1st edition, ITN, BUET.
4. Municipal Solid Waste Management- Mohammad Aktarul Islam Chowdhury.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	40
Apply	10
Analyze	30

Evaluate	10
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8.9.13. CE 4405

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4405 COURSE TITLE: Environmental Pollution Management		
CREDIT: 2.0 (Optional)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Identify sources and types of pollutants and evaluate their effects on surface/groundwater, air and noise pollution
CLO2	Comprehend the methods and applications to measure or detect pollutants, economic and health hazards.
CLO3	Apply recommended strategies to improve or manage surface/groundwater water, air and noise pollution, moreover, to prevent hazards on human health, livestock production and economic loss.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1						√	√					
CLO2						√	√					
CLO3						√	√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Environmental pollution and its control	1.0	CLO1, CLO2, CLO3
2	Sources and types of pollutants causing water pollution	2.0	CLO1
3	Waste assimilation capacity of streams	1.0	CLO2
4	Dissolved oxygen modeling	2.0	CLO2
5	Ecological balance of streams	1.0	CLO2, CLO3
6	Industrial pollution and heavy metal contamination	2.0	CLO1
7	Detergent pollution and eutrophication	1.0	CLO1, CLO2
8	Groundwater pollution	1.0	CLO1, CLO2
9	Marine pollution	1.0	CLO1, CLO2
10	Water quality monitoring and management	2.0	CLO1, CLO2, CLO3
11	Introduction to noise pollution and their effects	2.0	CLO1
12	Sources and types of pollutants causing air pollution	1.0	CLO1
13	Effects of various pollutants on human health, materials and plants	2.0	CLO1, CLO2

SN	COURSE CONTENT	Hrs	CLOs
14	Air pollution meteorology	1.0	CLO1
15	Global warming, climate change, ozone layer depletion and acid rain	2.0	CLO1, CLO2
16	Air pollution monitoring and control measures	2.0	CLO3
17	Introduction to air quality models	2.0	CLO2

TEXTBOOK:

1. Environmental Engineering, Peavy and Rowe, 1st edition, McGraw-Hill Science/Engineering/Math.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time.)

1. Basic Environmental Engineering, R.C. Gaur, New Age International Publishers.
2. Environmental Science and Ecological Studies, S.K. Garg, KHANNA PUBLISHERS.
3. Introduction to Environmental Engineering, Davis and Cornwell, 5th edition, Science Engineering & Math.
4. Environmental Engineering, Kiely, 1st edition, McGraw-Hill College.
5. Air Pollution Control Engineering, N. D. Nevers, 3rd edition, Waveland Press, Inc.
6. Air Pollution Control Engineering, L. K. Wang, N. C. Pereira and Y. T. Hung, 1st edition, Humana Press Inc., New Jersey.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	35
Analyze	25
Evaluate	10

8.9.14. CE 4407

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4407 COURSE TITLE: Environmental Impact Assessment
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CREDIT: 2.0 (Optional)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the different steps, key aspects, and case studies/examples of environmental impact assessment (EIA)
CLO2	Apply current environmental rules, legislation and EIA guidelines of Bangladesh for a development project
CLO3	Evaluate the environmental impacts, mitigate the negative impacts and create Environmental Management Plan for a development project

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1						√	√					
CLO2						√	√					
CLO3						√	√					

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Objectives and levels of Environmental Impact Assessment (EIA)	2.0	CLO1
2	General applicability of EIA	2.0	CLO1
3	Current environmental rules and legislation in Bangladesh	2.0	CLO2
4	Project screening; Initial Environmental Examinations	2.0	CLO1, CLO2
5	Methods of impact prediction and identification	2.0	CLO1, CLO2
6	EIA methodologies	2.0	CLO1, CLO2
7	Mitigation of Environmental impacts	2.0	CLO2, CLO3
8	Environmental Impact Statement case studies	2.0	CLO1
10	Monitoring of EIA	2.0	CLO1, CLO2
11	EIA guidelines in Bangladesh	2.0	CLO1, CLO2
12	Environmental Management Plan	2.0	CLO3

TEXTBOOK:

1. Environmental Impact Assessment, L.W. Canter, 2nd edition, McGraw-Hill Science/Engineering/Math.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. A Guide to Environmental Clearance Procedure-DoE, Ministry of Environment and Forests, Bangladesh.

2. Environmental Conservation Rule-1997, Bangladesh Gazette, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh.
3. Harvey, N and Clarke, B 2012. Environmental Impact Assessment in Practice, 1st Edition, Oxford Press.
4. Elliot, M. and Thomas, I. 2009. Environmental Impact Assessment in Australia, The Federation Press
5. Wood, C. 2003. Environmental Impact Assessment: A Comparative Review, Pearson Hall press.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	30
Apply	35
Analyze	15
Evaluate	10

8.9.15. CE 4503

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4503 COURSE TITLE: Traffic Engineering Design and Management		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the principles of traffic engineering, traffic system analysis, simulation, intelligent transportation system and non-motorized traffic.
CLO2	Apply traffic management strategies to solve real-life engineering problems.
CLO3	Analyze and design different roadway geometric features using modern technology.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CLO1	√			√								
CLO2	√			√								
CLO3			√		√							

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Advanced concepts of traffic management	2.0	CLO2
2	Management strategies	3.0	CLO2
3	Analysis of traffic flow characteristics	2.0	CLO1, CLO3
4	Traffic control devices	3.0	CLO1, CLO3
5	Intersection control and design	3.0	CLO1, CLO3
6	Grade separation and interchanges	2.0	CLO1, CLO3
7	Computer application in traffic system analysis	3.0	CLO3
8	Introduction to micro simulation	3.0	CLO3
9	Intelligent Transportation System (ITS), NMT issues and Road safety	5.0	CLO1, CLO3

TEXTBOOK:

1. Transportation Engineering and management, A. Delbose and W. Young, 3rd Edition, Mc Graw Hill publication.

REFERENCE BOOKS (List of reference books may vary depending upon the choice of course teachers and time):

1. Traffic and Highway Engineering, N. J. Garber and L. A. Hoel. 4th Edition, Cengage Learning publication.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	40	50
Apply	40	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	20
Apply	35
Analyze	35
Evaluate	-

8.9.16. CE 4505

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4505 COURSE TITLE: Pavement Management, Drainage and Airport		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand pavement planning and management techniques related to highway and airway pavements.
CLO2	Choose a proper drainage system for highway and airport pavements.
CLO3	Analyze and design the necessary structural and geometric elements of an airport, including signing, marking, and lighting.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√		√									
CLO2		√		√								
CLO3		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	Pavement management systems, evaluation and strengthening of pavements	5.0	CLO1
2	Drainage: highway drainage and drainage structures	3.0	CLO2
3	Importance, advantages and trends in air transportation, planning and design of airports	4.0	CLO1
4	Aircraft characteristics related to airport design	2.0	CLO1, CLO3
5	Types and elements of airport planning studies	3.0	CLO1
6	Airport configuration, geometric design of the landing area, terminal area, heliports	6.0	CLO3
7	Design of airport pavements, lighting, marking and signing of airport, airport drainage	3.0	CLO3

TEXTBOOK:

1. Planning and Design of Airport, R. Horronjeff, F. X. Mckelvy and W. J. Sproule, 5th Edition, Mc Graw Hill Publication.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Airport Engineering, N. J. Ashford and S. A. Mumayiz, 4th Edition, Mc Graw Hill Publication.

ASSESSMENT PATTERN

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	50	50
Apply	30	-
Analyze	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	10
Understand	30
Apply	40
Analyze	20
Evaluate	-

8.9.17. CE 4507

DEGREE PROGRAM: B.Sc. in Civil Engineering COURSE CODE: CE 4507 COURSE TITLE: Urban Transportation Planning and Management		
CREDIT: 2.0 (Theory)	SEMESTER OFFERED: 4 th Year 2 nd Semester	
Exam Hours: 3.00	CIE Marks: 30%	SEE Marks: 70%

Course Learning Outcomes (CLOs): On successful completion of this course, the student will be able to-

CLO1	Understand the principles of urban transportation planning and management, including traffic congestion, safety, case studies, and sustainability.
CLO2	Assess transportation engineering projects through a variety of economic analysis tools.

Mapping of Course Learning Outcomes (CLOs) to Program Outcomes (POs)-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	√			√								
CLO2		√	√									

Alignment of Topics of the Course with Contact Hours and CLOs

SN	COURSE CONTENT	Hrs	CLOs
1	The urban transport problems and trends	2.0	CLO1
2	Road network planning	1.0	CLO1
3	Characteristics and operation of different transit and para-	3.0	CLO1

SN	COURSE CONTENT	Hrs	CLOs
	transit modes		
4	Planning transit network	2.0	CLO1
5	Estimating system costs and benefits	2.0	CLO2
6	Pricing and financing, evaluation, transit users' attitude	1.0	CLO2
7	Policies and strategies for transit development in metropolitan cities	3.0	CLO1
8	Freight traffic planning and management	3.0	CLO1
9	Selected transport case studies	3.0	CLO1
10	Congestion management	2.0	CLO1
11	Safety management	2.0	CLO1
12	Environmental issues and sustainable transport	2.0	CLO1

TEXTBOOK:

1. Urban Transport Planning, John Black, Routledge Library Editions: 5th Edition, Urban Planning.

REFERENCE BOOKS: (List of reference books may vary depending upon the choice of course teachers and time)

1. Concepts in Urban Transportation Planning, M. G. Woldeamanuel, 4th Edition.

ASSESSMENT PATTERN:

CIE- Continuous Internal Evaluation

Bloom's Category	Class Tests (%)	In class Participation (%)
Remember	20	50
Understand	60	50
Apply	20	-
Analyze	-	-
Evaluate	-	-

SEE- Semester End Examination

Bloom's Category	Final Exam (%)
Remember	20
Understand	30
Apply	50
Analyze	-
Evaluate	-

Curriculum Alignment/Skill Mapping

Courses	Program Outcomes (POs) (Tick marks indicate that the corresponding course fulfilled the particular PO)
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1st Year 1st Semester												
HSS 1101						√					√	
EEE 1101	√	√										
CE 1000	√	√	√									
CE 1001	√	√			√							
CE 1002	√	√			√					√		
CE 1003	√											
CE 1005	√	√										
CE 1006	√	√	√		√							
CE 1008	√			√	√							
CE 1010	√	√		√	√	√						
1st Year 2nd Semester												
Math 1101	√	√										
Phy 1101	√	√										
Phy 1102	√	√							√	√		
Ch 1101	√	√										
Ch 1102	√	√							√	√		
HSS 1103										√	√	
HSS 1104									√	√		
CE 1011	√	√										
2nd Year 1st Semester												
Math 2101	√	√	√		√							
Phy 2101	√	√	√									
Phy 2102	√	√							√	√		
HSS 2102									√	√		
CE 2001	√	√	√									
CE 2002			√	√	√	√		√	√	√		
CE 2003	√	√										
CE 2005	√	√										
CE 2006	√			√					√	√		
2nd Year 2nd Semester												
Math 2103	√	√	√		√		√					
CE 2007	√	√	√	√								
CE 2009	√	√										
CE 2010	√	√	√	√								
CE 2012	√	√			√							
CE 2014	√		√			√	√		√	√		
CE 2101	√	√	√									
CE 2016	√	√	√	√		√			√		√	
CE 2201	√	√	√									
CE 2202	√			√					√	√		

3 rd Year 1 st Semester												
Math 3101	√	√	√	√								
CE 3002	√	√			√							
CE 3101	√	√										
CE 3103		√	√									
CE 3105	√	√	√									
CE 3106	√	√	√							√		
CE 3301	√	√										
CE 3302		√		√	√		√		√			
3 rd Year 2 nd Semester												
CE 3107	√	√										
CE 3108	√	√	√		√							
CE 3201		√	√									
CE 3303	√	√	√	√			√					
CE 3304		√		√	√		√		√			
CE 3401	√	√		√		√	√					
CE 3402				√	√	√	√		√	√		
CE 3501	√	√	√									
CE 3502	√		√	√	√				√	√		
4 th Year 1 st Semester												
HSS 4101						√						
CE 4000	√	√	√	√	√			√	√	√		√
CE 4002	√	√	√	√	√			√	√	√	√	√
CE 4003	√	√				√				√	√	
CE 4102	√	√	√									
CE 4201		√	√				√					
CE 4401	√	√	√			√	√					
CE 4402									√	√		
CE 4501	√	√		√								
CE 4502	√	√	√						√	√		
4 th Year 2 nd Semester												
CE 4000	√	√	√	√	√			√	√	√		√
CE 4002	√	√	√	√	√			√	√	√	√	√
CE 4005			√			√	√				√	√
CE 4007				√					√	√	√	√
CE 4009					√			√	√	√	√	
CE 4011			√	√		√	√	√		√		
CE 4012					√	√		√	√	√		√
Optional I												
Optional II												
Optional III												
Optional Courses												

CE 4103	√	√	√									
CE 4105	√	√	√									
CE 4107		√	√									
CE 4109	√	√		√								
CE 4111	√	√										
CE 4203		√	√									
CE 4205	√	√	√	√			√					
CE 4207	√	√	√	√								
CE 4301		√	√	√		√					√	
CE 4303		√	√	√		√						
CE 4305	√	√	√	√								
CE 4403						√	√					
CE 4405						√	√					
CE 4407						√	√					
CE 4503	√		√	√	√							
CE 4505	√	√	√	√								
CE 4507	√	√	√	√								

Appendix

About the University

The University

Dhaka University of Engineering & Technology (DUET), Gazipur in Bangladesh, Dhaka University of Engineering & Technology (DUET), Gazipur surrounded by scenic beauty and busy industrial area of Bangladesh. Only the Diploma in Engineering holders can avail of Bangladesh. Only the Diploma in Engineering holders can avail themselves of enrolling here for four years Bachelor degree in different branches of Engineering. The University originated in 1980 as College of Engineering at its temporary campus at Tejgaon, Dhaka under the University of Dhaka, offering four years 'Bachelor degree in Civil, Electrical & Electronic, Mechanical, Computer Science and Engineering, Textile, Industrial & Production, Architecture, Chemical & Food, and Materials and Metallurgical Engineering' to help meet the growing need for advanced engineering education in Bangladesh. After a short span of time, the College of Engineering is renamed Dhaka Engineering College (DEC). The then DEC was shifted to its present permanent campus at Gazipur in 1983. DEC was converted to Bangladesh Institute of Technology (BIT), Dhaka, as a degree-awarding Institute by a government ordinance in 1986 to find solutions to the various problem it had been facing since its inception.

The journey of BIT, Dhaka, was not also so smooth. It faced many problems and could overcome some of the issues faced by DEC. To alleviate this situation, from September 2003, Dhaka University of Engineering and Technology (DUET), Gazipur was created out of BIT, Dhaka. DUET has ultimately turned into an Institution, which can now boost its commitment to quality engineering education and has established a good reputation all over the world for the quality of its graduates. The curriculum and syllabus of DUET are continuously updated

to cope with the recent technological development as well as in line with that is being followed in the universities of developed countries. To give students hands-on training, an industrial attachment program is included in the curriculum. DUET addresses practical needs through undergraduate and graduate programs. At present, all efforts are being made to turn the DUET into a centre of excellence. At present there are four faculties in the university: (a) The Faculty of Civil Engineering; this Faculty comprises the Department of Civil Engineering, Department of Architecture, (b) The Faculty of Electrical and Electronic Engineering; this Faculty comprises the Department of Electrical, and Electronic Engineering and Department of Computer Science and Engineering, (c) The Faculty of Mechanical Engineering; this Faculty comprises the Department of Mechanical Engineering, Department of Textile Engineering, Department of Industrial & production Engineering, Department of Chemical & Food Engineering, and Department of Materials and Metallurgical Engineering, and (d) The Faculty of Engineering: this Faculty comprises the Department of Chemistry, Department of Mathematics, Department of Physics, and Department of Humanities and Social Sciences. At present, 4 years undergraduate degrees are offered in the University. The pace of development of DUET towards perfection has already been started. It will continue to convert this university into a centre of excellence for providing quality education by fulfilling the various state aims and objectives in which we are committed.

Location

The University is located at Gazipur District, 40 km north of Dhaka, the capital city of Bangladesh (about 20 km from Hazrat Shahjalal International Airport, Dhaka). This district town Gazipur is well connected by roads and railway with Dhaka and other cities of Bangladesh.

Campus

DUET, Gazipur has a compact campus with library, auditorium, halls of residence and residential buildings for teachers and employees within walking distance of the academic building. Bank and post office are also located in the premises.

Climate

Bangladesh generally enjoys a sub-tropical climate. The three prominent seasons are winter, summer and monsoon. The warmest days in the Dhaka region are between April and June, with temperatures ranging from 25°C to 37°C. Winter temperatures usually vary between 10°C to 20°C.

Accommodation

The University believes that campus life is an important aspect in the development process of students. In addition to providing services in assisting students for solving their problems that are affecting their studies, the University aims at creating an environment conducive to the promotion of interaction between faculty and student.

Accommodation is available on campus for about 40% of the student. The University has six halls of residence for the accommodation of the students. The total capacity of these halls is around 900. The halls are named after the national heroes, poets and eminent personalities of the world. The names of halls are listed below.

1. Kazi Nazrul Islam Hall

2. Shahid Muktijoddha Hall
3. Dr. Qudrat-E-Khuda Hall
4. Dr. Fazlur Rahman Khan Hall
5. Madam Curie Hall
6. Shahid Tajuddin Ahmed Hall

Non-residential students are also to be attached to a hall, so that administrative control on students becomes hall-based. Two to four students have to share a room depending upon the size of the room with a common shower and toilet. All rooms are furnished and well-ventilated. All residential halls are equipped with modern recreational facilities like cable TV, common room, prayer room, reading room and library.

Food and Stationeries

Each residential hall has its own cafeteria, which serves two meals per day. Each cafeteria is maintained by each hall authority. Students are also involved for their daily menu. Special menus are provided for different occasions in the hall cafeteria. One annual colorful dinner is also arranged in each hall in honor of outgoing students. Head of the Institute, all Departmental Heads, Provosts, Assistant Provosts, and many other faculty members are invited to enjoy dinner. Besides, this residential hall cafeteria, a big central canteen offers breakfast meals and snacks. Moreover, in Gazipur town, there are number of nice restaurants which serve a wide variety of food including oriental and western flavor. A departmental store is also housed in the campus for the benefit of all.

Sports and Entertainment

The physical education centre provides different sports facilities to the students to acquire physical fitness indispensable for healthy mind and body. University has a beautiful playground for football, cricket, badminton, volleyball etc. Central indoor and outdoor sports competition are arranged annually by physical education section. The University also organizes annual cultural competitions and occasional cultural programs on some special events like celebration of different national days. Besides, several cultural and social groups are also active in the campus.

Library

The university devotes considerable effort and resources to the development of outstanding library collections to meet the expanding need of teaching and research and to serve as a resource reference centre. The library has over 30,000 books, significant number of journals, thesis, dissertation, magazines, newspapers, and reports. Besides these, with the membership of a consortium it has on-line access to many international research journals. Library service includes reading, lending, reference, and photocopying and document delivery service. The library is computerized and most of the information available on the internet. It is open from 8:00 A.M to 8:00 P.M except for certain official holidays. Besides the general library system, each academic discipline maintains rental library from which students can borrow textbooks at a nominal rate for the whole semester. To meet the demand of the day, the library has opened up Muktijoddha corner (collection about liberation war) in it.

Computer Centre

The Computer Centre of Dhaka University of Engineering & Technology, Gazipur develops and manages the computing and networking infrastructure of the university. It provides

computing support to undergraduate and postgraduate teaching, learning and research works for all departments. In addition, the Compute Centre also looks after the central internet facilities for the students and teachers.

In the Dhaka University of Engineering & Technology, Gazipur; the computing environment is based on distributed client server architecture. The basis is an advanced high speed and fault tolerant switched Ethernet network backbone. A switched fiber optic gigabit Ethernet backbone is under development. 24 hours Internet connection is provided by 10 Mbps line from BTCL. Most of the laboratories and offices are provided with switched Ethernet of fast Ethernet connections.

The Computer Centre operates three dual processor Intel based enterprise servers (one IBM and two HP server) and two small range servers (one mail server and one proxy server) to provide campus wide network services such as internet, E-mail, network printing, file sharing etc. Total file system capacity of these servers exceeds 100 Gigabytes. At present 600 state of the art workstations are connected to the network.

The Computer Centre provides excellent Internet facilities to the students, teachers and staffs. All teachers, students and staffs have their own E-mail address. Software training programs are also organized to assist students to be professional. Multimedia projectors are used in those programs to provide audio visual facilities.

Medical Centre

The university has a well-equipped four bedded medical centre with a number of medical officers and supporting staffs within prescribed limits. Medical centre is situated at ground floor of the central library building. Director (Students' Welfare) and chief medical officer give the valuable advice for the development and improvement of medical centre as well as healthcare services in this university.

The university medical centre provides different healthcare facilities to the residential and nonresidential students and staffs to meet physical and mental fitness. Students are given free outpatient prescription with necessary medicines at the expense of the university. Teachers, Officers, Employees are given only free prescription and disease related valuable advice about various kinds of diseases in the medical centre. All kinds of minor operations are performed under local anesthesia in the medical centre. Medical centre also arranges annual blood donation and vaccination programs. Students are given general knowledge about primary health-care system, preventive and social medicine. Only complicated surgical and medical emergency patients are referred urgently to the district Sadar Hospital, Gazipur and Dhaka Medical College Hospital for investigations and better treatment. The university medical centre does not however bear the cost of treating injuries occurred outside the university.

Transportation

For the convenience of the students, faculties, officers, and staffs DUET, Gazipur operates its own shuttle Bus Service between Dhaka city and the campus. In weekends, special services are also provided for meeting the weekend recreational and other needs.

Students' Welfare

The Director of Students' Welfare is responsible for the various activities related to the physical, social, cultural, and other aspects of welfare of the students. These include arrangement of supervision for halls of residence, programmes for physical education, games and sports, cultural weeks, and other activities of the students through the central students' union and the students' unions of the various halls of residence.

Central Students' Union

The purpose of the Central Students' Union is to promote the interests and welfare of the student body and to promote awareness of the healthy atmosphere on the university campus. The students' union also help to provide an opportunity for everyone to mix with fellow students from different parts of the country and appreciate their cultures. All full-time students are members of the Central Students' Union and are entitled to vote in the election of the unions governing body. The Students' Unions of the various hall of residence also arrange their individual socio-cultural activities, literary competitions etc. and help the hall management to run the halls smoothly.

Administration

University Administration is mostly defined and determined by the University Act (Dhaka University of Engineering & Technology, Gazipur Act, 2003). According to the University Act, Syndicate is the supreme authority in supervising and controlling all the activities of the University and major policy making, approving recommendations of all subordinate bodies. It also exercises its common controlling power through the Vice-Chancellor by formulating and implementing Act, Statutes, Rules and Regulations of the University.

The Finance committee, Planning & development committee, Selection committee and other statutory bodies and committees assist the Syndicate by recommending rules and regulations and other decisions as per need of the University.

The Academic Council is the supreme authority for matters relating to Education and Research. It exercises its common controlling power by formulating Academic Rules & Regulations and controlling all Academic activities and Research through Faculties, Departments, Academic committees, CASR (Committee for Advanced Studies and Research), committee relating to discipline etc. It also recommends necessary Rules and Regulations (Proposed) before the Syndicate for final approval.

Vice-Chancellor is the Chief Executive Officer (CEO) for both Academic and Administrative purposes. He is responsible for all of his activities to the Chancellor (Honorable President, People's Republic of Bangladesh). According to University Act, Vice-Chancellor is the Chairman of Syndicate, Academic Council, Finance Committee, Planning and Development Committee and all Selection Boards. He exercises his common controlling power over all the Faculties, Departments, Directories, Offices, Halls and different Sections through Deans, Head of Departments, Directors, Head of Offices (Registrar, Controller of Examinations, Comptroller, Chief Medical Officer, Chief Engineer, and Librarian etc.), Hall provosts and other Heads of different Sections.

Registrar is the residential Officer of the University. He is the custodian of all records, common seal and assets or property as the Syndicate may commit to his charge. He is the Secretary of the Syndicate & Member Secretary of the Academic Council. He is also the member of the Finance committee. He is mainly responsible for implementing the decisions,

made by the Syndicate, Academic Council and Vice-chancellor himself and decision taken from the recommendation of different bodies and committees. Major Human Resource Management (HRM) functions (Manpower acquisition, Training & Development, Placement, Motivation etc.) are performed by the Establishment Section. Student's Enrolment, Registration, all Academic activities, Programme and Schedules are prepared and published by the Academic Section of the Registrar Office. Registrar is also responsible for the security matters of the University. Generally, Vice-Chancellor practices his common controlling power over all the Departments, Offices and Sections through Registrar Office.

Department of Civil Engineering

The Department

Civil engineers involve themselves in plan, design, implementation and monitoring of infrastructural development projects. It means that civil engineers are directly involved in the development process of a nation and hence, active participants in the nation building activities. Better understanding of the civil engineering problems, sound and updated knowledge is essential for engineers to be successful in their professional life to meet the challenges in an appropriate way. Civil engineering program in DUET, Gazipur is designed to provide the students with the fundamental knowledge, basic understanding of civil engineering and to make them familiar with state of the art of knowledge and latest developments for entering a wide variety of professional career including research and developments. To enhance and uphold the professional efficiencies, high quality teaching and research are intensified. By doing so Civil Engineering Department has been producing quality civil engineers to be accepted nationally and internationally.

The Department of Civil Engineering comprises of five major divisions: Structural Engineering, Water Resource Engineering, environmental Engineering, Geotechnical Engineering and Transportation Engineering. The divisions offer basic and advanced optional courses in the above disciplines. Research on these fields is extremely important in national and international context. These areas include earthquake engineering, seismology, behavioral analysis of available building and road materials and improving the quality of present materials, engineering properties of soil from various regions of the country, earthquake resistant structural design, low cost cyclone housing, issues related to climate change, seismic zoning of Bangladesh, waste management, environmental pollution control, environmental impact assessment, traffic simulation, transport system modeling, traffic safety studies, specializing in hydrology, hydraulics, irrigation, drainage, flood control, and reclamation, bank protection, river stabilization, ground water, sedimentation problems and coastal engineering etc. Some research projects of more fundamental nature of instance, application of finite element techniques in tackling engineering problems, dynamic behavior of multistoried buildings and bridges, soil structure interaction and concrete technology etc. pursued in this department have greatly contributed to the advancement of knowledge.

To facilitate the testing materials, the department is enriched with several laboratories for carrying out research and to introduce undergraduate students with different experiments in different disciplines. Among different laboratories, the prominent ones are: Mechanics of Solids laboratory, Concrete laboratory, Environmental Engineering laboratory, Geotechnical Engineering laboratory, Water Resources Engineering laboratory, Transportation Engineering

laboratory. In the laboratory modern equipments are available for carrying out experimental investigation.

The Divisions offer specialized technical services in the respective disciplines. Highly qualified and diversely experienced consultants of these divisions have been involved in the solution of various engineering problems. A wide range of quality control testing facilities is also available for materials; those are used in civil engineering field. Expert consultancy services ranging from the design, construction and rehabilitation of buildings, bridges, and other structures to planning and design of highways, railways, water supply and sewage treatment plants together with environmental impact assessment for these projects are routinely carried out. In the recent past, highly experienced, and expert consultants of the Department of Civil Engineering have been involved in the major projects.

Civil Engineering has traditionally used imagination, judgment, reasoning, and experience to apply science, technology, mathematics, and practical experience to materialize a concept. Civil Engineering department ties these foundations to a diverse program – one that uses knowledge from a variety of engineering disciplines to work on the complex technical challenges faced by society in this millennium.

Academic Ordinance for Undergraduate Studies

(Approved by the Syndicate upon the recommendation of the Academic Council)

1. Definitions

- 1.1 'University' means the Dhaka University of Engineering & Technology, Gazipur abbreviated as DUET, Gazipur.
- 1.2 'Syndicate' means the Syndicate of the University,
- 1.3 'Academic Council' means the Academic Council of the University.
- 1.4 'Chancellor' means the Chancellor of the University.
- 1.5 'Vice-Chancellor' means the Vice-Chancellor of the University.
- 1.6 'Dean' means the Dean of a faculty of the University.
- 1.7 'Head of the Department' means the Head of a department of the University.
- 1.8 'Registrar' means the Registrar of the University.
- 1.9 'Academic Committee' means the Academic Committee for Undergraduate Studies (ACUG) of a degree awarding department of the University.
- 1.10 'Degree' means the degree of Bachelor of Science in a particular discipline of Engineering offered by the University.
- 1.11 'Departmental Monitoring Committee' means the Committee for upgrading/changing the Undergraduate Curriculum and the Course system and monitoring the teacher-student activities.
- 1.12 'Degree Equivalence Committee' means the committee for equivalencing different degrees obtained from home and/or abroad.
- 1.13 'Teacher' means Professor, Associate Professor, Assistant Professor, Lecturer, and any other person approved as a teacher by the University.
- 1.14 'Student' means Student who has been admitted into the regular academic curriculum of the University.

2. Faculties

The University shall have the following Faculties:

- i. Faculty of Civil Engineering is comprised of
 - a. Department of Civil Engineering
 - b. Department of Architecture
- ii. Faculty of Electrical and Electronic Engineering is comprised of
 - a. Department of Electrical and Electronic Engineering
 - b. Department of Computer Science & Engineering
- iii. Faculty of Mechanical Engineering is comprised of
 - a. Department of Mechanical Engineering
 - b. Department of Textile Engineering
 - c. Department of Industrial & Production Engineering
 - d. Department of Chemical & Food Engineering
 - e. Department of Materials and Metallurgical Engineering
- iv. Faculty of Engineering is comprised of
 - a. Department of Chemistry
 - b. Department of Mathematics
 - c. Department of Physics
 - d. Department of Humanities & Social Sciences

3. Departments

The University shall have the following Departments:

3.1 Degree-Awarding Departments

- i. Department of Civil Engineering
- ii. Department of Electrical and Electronic Engineering
- iii. Department of Mechanical Engineering
- iv. Department of Computer Science and Engineering
- v. Department of Textile Engineering
- vi. Department of Industrial & Production Engineering
- vii. Department of Architecture
- viii. Department of Chemical & Food Engineering
- ix. Department of Materials and Metallurgical Engineering
- x. Any other department to be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

3.2 Teaching Departments

- i. Department of Civil Engineering
- ii. Department of Electrical and Electronic Engineering
- iii. Department of Mechanical Engineering
- iv. Department of Computer Science and Engineering
- v. Department of Textile Engineering
- vi. Department of Industrial & Production Engineering
- vii. Department of Architecture
- viii. Department of Chemical & Food Engineering
- ix. Department of Materials and Metallurgical Engineering
- x. Department of Mathematics
- xi. Department of Physics
- xii. Department of Chemistry
- xiii. Department of Humanities & Social Science
- xiv. Any other department that may be instituted by the Syndicate on the recommendation of the Academic Council from time to time.

4. Degrees Offered

The University shall offer courses leading to the award of the following degrees:

- i. Bachelor of Science in Civil Engineering abbreviated as B. Sc. Engineering (Civil)
- ii. Bachelor of Architecture abbreviated as B. Arch
- iii. Bachelor of Science in Computer Science and Engineering abbreviated as B. Sc. Engineering (Computer Science and Engineering)
- iv. Bachelor of Science in Electrical and Electronic Engineering abbreviated as B. Sc. Engineering (Electrical and Electronic)
- v. Bachelor of Science in Mechanical Engineering abbreviated as B.Sc. Engineering (Mechanical)
- vi. Bachelor of Science in Industrial & Production Engineering abbreviated as B.Sc. Engineering (IPE)
- vii. Bachelor of Science in Textile Engineering abbreviated as B. Sc. Engineering (Textile)
- viii. Bachelor of Science in Chemical & Food Engineering abbreviated as B. Sc. Engineering (CFE)

- ix. Bachelor of Science in Materials and Metallurgical Engineering abbreviated as B. Sc. Engineering (MME)
- x. Any other degree that may be awarded by a department with the approval of the syndicate on recommendation of the Academic Council from time to time.

5. Student Admission

- 5.1** The four academic years of study for the degree of B. Sc. Engineering shall be designated as first year class, second year class, third year class and fourth year class in succeeding higher levels of study. Each academic year comprises two semesters, i.e., 1st and 2nd semester. Students shall generally be admitted into the 1st year 2nd semester class. The 1st semester of 1st year class is exempted because of the candidates' completion of minimum 4-years Diploma in Engineering backgrounds after 10 years of schooling.
- 5.2** An Admission Committee shall be formed in each academic session by the Academic Council for admission into 1st year B. Sc. Engineering program.
- 5.3** A candidate for admission into the 1st year class must have passed the minimum 4-years Diploma in Engineering examination from Bangladesh Technical Education Board (after 10 years of schooling) or any examination recognized as equivalent there to and must also Dhaka University of Engineering & Technology, Gazipur fulfill all other requirements as may be prescribed by the Admission Committee. In case of confusion regarding the equivalence the case may be referred to the Degree Equivalence Committee. However, a candidate must fulfill the requirements mentioned below:

Sl. No.	Name of the Department	Entry Requirements
1.	Civil Engineering	Diploma in Engineering (Civil/ Civil with wood specialization/ Architecture with special optional subjects/Environmental with special optional subjects, Surveying and Construction Technology)
2.	Electrical and Electronic Engineering	Diploma in Engineering (Electrical/ Electronics/ Telecommunication/ Electro medical/ Instrumentation & Process Control)
3.	Mechanical Engineering	Diploma in Engineering (Mechanical/ Power/ Chemical/ Automobile/ Refrigeration and Air Conditioning/ Food/ Mechatronics/ Marine Technology)
4.	Computer Science and Engineering	Diploma in Engineering (Computer/ Computer Science & Technology/ Electronics/ Data Telecommunication and Networking Technology)
5.	Textile Engineering	Diploma in Engineering (Textile/Jute/ Garments & Pattern Making Technology)
6.	Industrial & Production Engineering	Diploma in Engineering (Mechanical/ Power/ Chemical/ Automobile/ Refrigeration and Air Conditioning/ Food/ Marine/ Mechatronics/ Ship Building/Instrumentation & Process Control Technology)
7.	Architecture	Diploma in Engineering (Architecture/ Architecture & Interior Design)
8.	Chemical & Food Engineering	Diploma in Engineering (Food/ Chemical/ Mechanical/ Power/ Refrigeration and Air Conditioning/ Instrumentation & Process Control Technology) and Diploma in Agriculture
9.	Materials and	Diploma in Engineering (Mechanical/ Power/ Automobile/

	Metallurgical Engineering	Refrigeration and Air Conditioning/ Chemical/ Mining & Mine Survey/ Ceramic/ Glass/ Ship Building Technology).
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- 5.4 The rules and conditions for admission into various departments shall be framed by the Academic Council on the recommendation of the Admission Committee in each year.
- 5.5 All candidates for admission into B. Sc. Engineering programmes must be citizens of Bangladesh unless the candidature is against the seats those are reserved for foreign students. Candidates for all seats except the reserved ones, if any, shall be selected based on merit. The rules for admission into the reserved seats shall be framed by the Academic Council on the recommendation of the Admission Committee.
- 5.6 No student shall ordinarily be admitted into 1st year after the start of the corresponding classes. The date of commencement of classes for the newly admitted students will be announced in advance.
Prior to admission to the University every student shall be examined by a competent medical officer as prescribed in the admission rules.
- 5.7 Admission of a newly admitted student in the 1st year class will be cancelled if he/she remains absent without prior permission from University authority for ten working days after the start of class. If any student fails to report due to unavoidable circumstances within the stipulated period, he/she may appeal within the next twenty working days to the Academic Council through the concerned Head of the Department. The decision of the Academic Council will be final.

6. Method of Course Offering and Instruction

The undergraduate curriculum of the University is based on course system. The salient features of the course system are as follows:

- Generally, number of regular theoretical courses taken by a student will not exceed five in each semester.
- Continuous evaluation of student's performance.
- Evaluation by using Letter Grades and Grade Points.
- Introduction of some additional optional courses and thus enable students to select courses according to his/her interest as far as possible.
- Opportunity for students to choose fewer or more courses than the normal course load depending on his/her capabilities and needs.
- The flexibility to allow the student to progress at his/her own pace depending on his/her ability or convenience, subject to the regulations on credit and minimum grade point average (GPA) requirements.
- Promotion of teacher-student contact. In the curriculum for the undergraduate programs, besides the professional courses pertaining to each discipline, there is a strong emphasis on acquiring a thorough knowledge in basic sciences of mathematics, physics and chemistry and subjects in humanities and social sciences. Emphasis has been given on introducing courses dealing with professional practices, project planning and management, socioeconomic and environmental aspects of development projects, communicative skills etc. This will help the students to interact more positively with the society.

7. Academic Calendar

- 7.1 The academic year shall ordinarily be divided into two regular semesters each having duration of ordinarily not less than 13 teaching weeks (65 working days) of classes.
- 7.2 There shall be final examinations at the end of each semester and the examination will be conducted as per academic regulations.
- 7.3 The registrar office will announce the academic schedule for each semester ordinarily before the start of the class on the approval of the Academic Council.
- 7.4 Academic schedule may be prepared according to the following guidelines:

Two alternatives are provided: (i) based on two regular semesters with a provision of a review examination in each semester, and (ii) based on two regular semesters and a short semester of about 8-week duration during one academic year whenever possible.

ALTERNATIVE: I

Semester-I	No. of Weeks 23
Classes	13
Mid Semester Break	1
Regular & Review examination including preparatory leave*	6.4**
Publication of results	2.3**
Inter-Semester Recess and Preparation for next semester	1
Semester-II	No. of Weeks 23
Classes	13
Mid Semester Break	1
Regular & Review examination including preparatory leave*	6.4**
Publication of results	2.3**
Inter-session break and Vacations throughout the session	05
Total =	52

* There shall be at least one examination date in a week.

** The digit after the decimal indicates number of days.

ALTERNATIVE: II

Semester-I	No. of Weeks 21
Classes	13
Regular examination including preparatory leave*	5.4**
Publication of results	2.3**
Inter-Semester Recess and Preparation for next semester	1
Semester-II	No. of Weeks 21
Classes	13
Regular examination including preparatory leave*	5.4**
Publication of results	2.3**
Inter-session break and Vacations throughout the session	09
Total =	52

* There shall be at least one examination date in a week.

** The digit after the decimal indicates number of days.

8. Duration of Programme and Course Structure

- 8.1** The B Sc. Engineering programme shall extend over a period of four academic years, each with a normal duration of one calendar year. Each academic year is divided into two semesters (except the 1st year) for the purpose of academic programme and conduct of examinations.
- 8.2** The curricula of the B. Sc. Engineering degree in the different departments shall be as proposed by the respective ACUG and approved by the Academic Council on the recommendation of the Executive Committee of the concerned Faculty.
- 8.3** The ACUG may review the curricula once in every academic year and put forward suggestions to the Academic Council through the Executive Committee of the respective Faculty.
- 8.4** The courses are reckoned in credits and the credits allotted to various courses will be determined by the ACUG with the following guidelines:

	Nature of Course	Contact Hour *	Credit
(i)	Theory /Lecture	1.0 hour/week	1.0
(ii)	Tutorial	1.0 hour/week	1.0
(iii)	Independent Lab/Sessional/Design	1.5 hours/week	0.75
(iv)	Project/Thesis	3.0 hours/week	1.5
(v)	Field Work/Industrial Attachment	3.0 weeks	1.5
(vi)	Seminar/Special Studies	3.0 hours/week	1.50

* 1.0 Contact hour means a class with a minimum period of 50 minutes.

- 8.5** The minimum credits for the award of bachelor's degree in engineering will be decided by the respective ACUG and approved by the Academic Council on the recommendation of the Executive Committee of the Faculty. However, at least **140** credits including the specified core courses must be earned to be eligible for graduation.
- 8.6** The total number of credits for which a student should register shall be from 15 to 24 credits in a semester except the review course. However, a student may be allowed to register for less than 15 credits in a semester if
- he/she is considered academically weak,
 - number of credits required for graduation is less than 15 in that semester,
 - student cannot find appropriate courses for registration subject to the approval of the adviser.
- 8.7** The total contact hours for students including lecture, tutorial and lab/sessional should be around 30 periods per week, each period being of 50 minutes duration.
- 8.8** In each degree-awarding department, one of the Assistant Professors or above nominated by the Head of the Department for one Academic year will act as Course Coordinator as well as Member Secretary of ACUG.
- 8.9** A course plan showing details of lectures for each course, approved by the Head of the department is to be announced at the start of each semester.
- 8.10** Project and thesis should be of 1.5 credits in each semester. Credit in any theory subject

should not exceed 4 and that in sessional subject should not exceed 1.5.

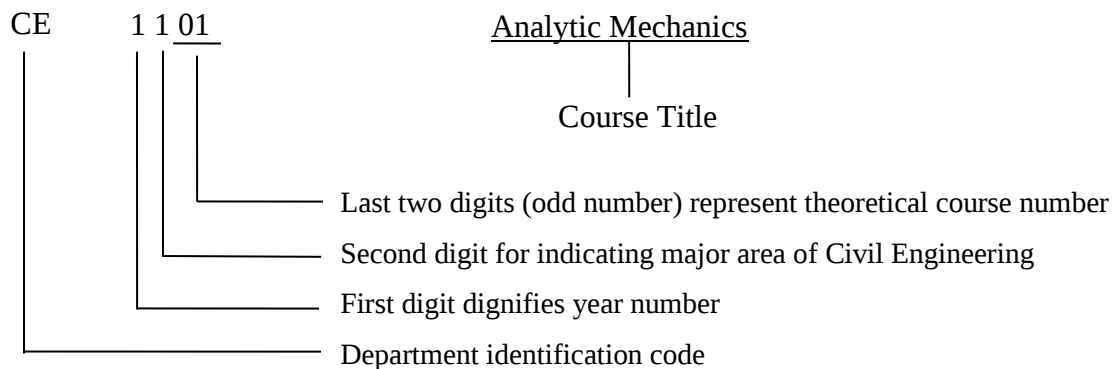
9. Course Designation and Numbering System

Each course is designated by a two to four letter word identifying course offering department followed by a three-digit number with the following criteria:

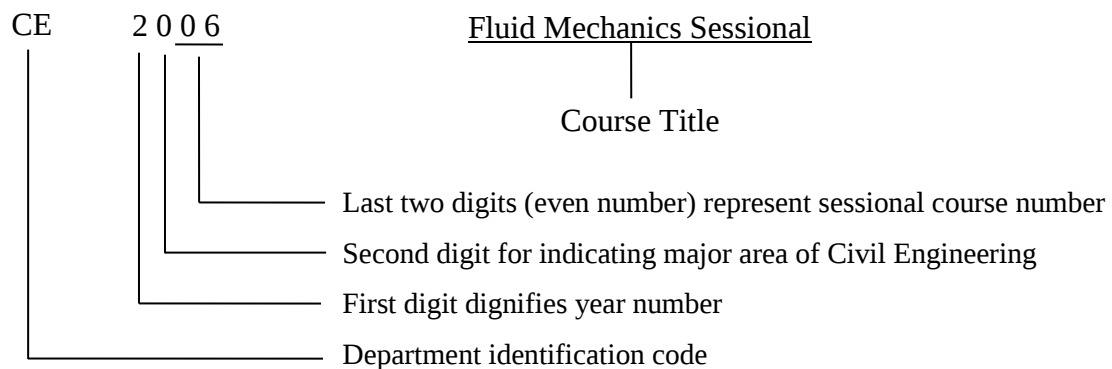
- The first digit will correspond to the year in which the course is normally taken by the students.
- The second digit will be reserved for departmental use.
- The last digit will usually be odd for theoretical and even for laboratory or sessional courses.

The course designation system is illustrated by two examples as shown below:

Example 1:



Example 2:



Major Areas:

- | | |
|---|--|
| 1 – Structural Engineering Course | 4 – Environmental Engineering Courses |
| 2 – Water Resources Engineering Courses | 5 – Transportation Engineering Courses |
| 3 – Geotechnical Engineering Courses | |

10. Type of Courses

The courses included in undergraduate curricula are divided into several groups as follows:

10.1 Core Courses

In each discipline several courses will be identified as core courses which form the nucleus of the respective bachelor's degree programme. A student must complete all of the designated core courses for his discipline.

10.2 Pre-requisite Courses

Some of the core courses are identified as pre-requisite courses. A pre-requisite course is one which is required to be completed before some other course(s) can be taken. Any such course on which one or more subsequent courses build up, may be offered in each of the two regular semesters.

10.3 Optional Courses

Apart from the core courses, students will have to complete several courses which are optional in nature. In that case, students will have some choice to choose the required number of courses from a specified group/number of courses.

10.4 Non-Credit Courses

Non-credit course(s) may be offered to a student to improve his/her knowledge in some specific fields. The credits in these courses will not be counted towards GPA and Cumulative GPA calculation but will be reflected in the transcript as satisfactory (S)/unsatisfactory (U). Non-credit course(s) may be offered under the following circumstances:

If a student's Thesis/Project supervisor feels that the study/design is highly related to course(s) offered by any other department for its students, he can recommend to the concerned Head of the Department for participation of the student(s) in the course(s). Such registration of course(s) will not affect the normal course registration of the student.

11. Departmental Monitoring Committee and Students' Advisor

11.1 Departmental Monitoring Committee

Consistent with its resilient policy to keep pace with new development in the field of Engineering and Technology, the university will update its course curricula at frequent intervals. Such updating aims not only to include the expanding frontiers of knowledge in the various fields but also to accommodate the changing social, industrial, and professional needs of the country. This can be done through deletion and modification of some of the current courses and through the introduction of new ones.

ACUG of each department will constitute a Departmental Monitoring Committee with three senior teachers of the department as members and Head of the department as chairman. This committee will monitor and evaluate the effectiveness of the Course System within the department. In addition to other teachers of the department, the committee may also propose

from time to time to the ACUG any changes and modifications needed for upgrading the Undergraduate Curricula and the Course System.

11.2 Students' Advisor

One advisor will be assigned for a batch of students by the Head of the Department who will advise each student on the courses to be taken by the student. The adviser will discuss with the student his academic programme and then decide the number and nature of courses for which he/she can register. However, it is the student's responsibility to keep contact with his/her adviser who will review and eventually approve the student's specific plan of study and check on subsequent progress. The adviser should generally be of the rank of an Assistant Professor or above from the concerned department. However, in case of shortage of teachers, lecturer may also act as adviser.

For a student of second and subsequent semesters, the number and nature of courses for which he/she can register will be decided based on his/her academic performance during the previous semester. The adviser will advise the students to register for the courses during the next semester within the framework of the guidelines in respect of minimum/maximum credit hour limits. The Adviser is also authorized to permit the student to drop one or more courses based on his academic performance. Special provisions exist for academically weak students regarding make-up courses.

11.3 Teacher Student Contact

The proposed system encourages students to come in close contact with teachers. For promotion of teacher-student contact, each student is assigned to an Advisor and the student is free to discuss with his/her advisor about all academic matters, especially those related to courses taken and classes being attended by him/ her. Students are also encouraged to meet other teachers any time for help on academic matters.

12. Course Registration and Its Procedure

Any student who wants to study a course is required to register formally. The following steps will be maintained during registration:

- i. Student (both resident/attached) will collect registration form from respective office of hall of residence and take the signature of provost to ensure that he has no dues related to the hall.
- ii. After collecting registration form, each student will fill up his/her course registration form in consultation with his/her adviser. The advisor will write the number of courses and sign it.
- iii. Students will collect the fee deposit form from account section of the university.
- iv. After filling up the fee deposit form, students will deposit registration fee in the bank prescribed by the university.
- v. Students will submit registration form and the fee deposit form to his/her adviser.
- vi. Adviser will submit duly signed registration form along with fee deposit form (copy for accounts section) to the head of the department.
- vii. Head of department will send the duly signed course registration form to the academic section.
- viii. The requisite number of copies of the course registration form will be made by the

academic section for distribution among the adviser, the head and controller of examination.

For Online Course Registration, students must go to this site:

<http://www.duetbd.com/eregistration/>

An online course registration manual is available there for the benefit of students.

12.1 Credit Limit in a Semester

A student must be enrolled for the requisite number of credits as mentioned in article 8.6. A student must enroll for the prescribed sessional/laboratory courses in the respective semester within the allowed credit limits.

12.2 Pre-condition for Registration

A student will be allowed to register those courses subject to the capacity constraints and satisfactory completion of prerequisite courses. If a student fails in a pre-requisite course in any semester, the concerned department monitoring committee may allow him/her to register for a course which builds on the pre-requisite course, when his/her attendance and grades in continuous assessment in the said pre-requisite course are found to be satisfactory.

Registration will be done within the first ten working days of each semester. Late registration is, however, permitted under special circumstances within next five working days on payment of late registration fee as decided by the authority. Students having outstanding dues to the University or a hall of residence shall not be permitted to register. All students have, therefore, to clear their dues prior to complete the course registration procedure.

12.3 Course Adjustment Procedure

A student would have some limited options to add or replace courses from his/her registration list, within the first ten working days from the beginning of the semester. Dropping of a course is allowed within twenty working days from the beginning of the semester. Adjustment of initially registered courses in any semester can be done by duly completing the Course Adjustment Form. These forms will normally be available in the academic section.

Any student willing to add, replace or drop courses will have to fill up a Course Adjustment Form in consultation with his/her adviser. The original copy of the Course Adjustment Form will be submitted to the academic section, and then the requisite number of copies will be made by the academic section for distribution among the concerned adviser, Head, student and controller of examination.

Any changes in courses must be approved by the Adviser and the concerned Head of the department. The Course Adjustment Form will have to be submitted to the academic section after duly filled in and signed by the persons concerned.

12.4 Withdrawal from a Semester

If a student is unable to complete the semester Final Examination due to illness, accident or any other valid reason etc., he/she may apply to the Registrar through the Head of the department for total withdrawal from the semester within five working days after the end of the semester final examination. However, he/she may choose not to withdraw any laboratory/sessional course if the grade obtained in such a course is 'D' or higher and he/she has to indicate that clearly in the withdrawal application. The withdrawal application must be

supported by a medical certificate from the University Medical Officer. The Academic Council will take the final decision about such application.

13. Striking off the Names and Readmission

13.1 The names of the students shall be struck off and removed from the student list on the following grounds:

- i. Non-payment of University fees and dues within the prescribed period.
- ii. Forced to discontinue his/her studies under disciplinary rules.
- iii. Withdrawal of names from the University on grounds acceptable to the Vice-Chancellor of the University after having cleared all dues.
- iv. Failure to earn the required credits for graduation as outlined in the respective curriculum and/or fulfill the Cumulative GPA requirements within the maximum allowed time of 7 academic years including any period of punishment. On valid medical grounds, the period may be extended by the approval of Academic Council.

13.2 In case a student whose name has been struck off the student list under clause (i) of Article 13.1 seeks re-admission within the session in which his/her name was struck off, he/she shall be re-admitted on payment of all the arrear fees and dues. But if he/she seeks readmission in any subsequent session, the procedure for his/her readmission will be the same as described under Article 13.3.

13.3 Every student whose name has been struck off the student list by exercise of the clause (ii) of Article 13.1 seeking readmission after expiry of the period for which he/she was forced to discontinue his/her studies, shall apply to the Head of the Department in the prescribed form before the commencement of the session to which he/she seeks re-admission. The Head of the department shall forward the application to the Vice-Chancellor of the University with his remarks. In case the re-admission is allowed, the student will be required of payment of all dues to get him/herself admitted not later than one week from the date of permission given by the Vice-Chancellor. All re-admissions should preferably be completed before the session starts. The percentage of attendance of the readmitted students shall be counted from the date of re-admission.

13.4 The application of a student for readmission will only be considered if he/she applies within two academic sessions from the semester of discontinuity in his/her studies in the University. Other than the department as punishment under ordinance of the University relating to discipline, a student of any kind failing for any other reason whatsoever to become a candidate for a semester final examination in which he/she ought to have had in the usual process of his/her progressive academic activities, shall be considered to have discontinued his/her studies for the relevant semester together with striking the name off from current student list and two such discontinuous periods will be considered equivalent to that for one academic session. The maximum period of discontinuity under no circumstances is to exceed two academic sessions during a student's period of studies for the degree.

13.5 No student who has withdrawn his/her name under clauses (iii) and (iv) of Article 13.1 shall be given re-admission.

13.6 In case any application for re-admission is rejected, the student may appeal to the Academic Council for re-consideration. The decision of the Academic Council shall be final.

14. Grading System, Calculation of GPA and Cumulative GPA, and Conversion of Marks

14.1 Grading System

The letter grade system shall be used to assess the performance of the student and shall be as follows:

Numerical Grade	Letter Grade	Grade Point
80% or above	A Plus	4.00
75% to less than 80%	A Regular	3.75
70% to less than 75%	A Minus	3.50
65% to less than 70%	B Plus	3.25
60% to less than 65%	B Regular	3.00
55% to less than 60%	B Minus	2.75
50% to less than 55%	C Plus	2.50
45% to less than 50%	C Regular	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

A grade 'X' shall be awarded for courses (like project & thesis, etc.) in the odd semester, which will continue through the even semester.

14.2 Calculation of GPA and Cumulative GPA

Grade Point Average (GPA) is the weighted average of the grade points obtained in all the courses passed/completed by a student in a semester. 'F' grades will not be counted towards GPA calculation. GPA of a semester will be calculated as follows:

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

where n is the total number of courses passed by the student, C_i is the number of credits allotted to a particular course i, and G_i is the grade point corresponding to the grade awarded for i -th course.

The overall or Cumulative GPA gives the cumulative performance of the student from the first semester up to any other semester to which it refers and is computed by dividing the total grade points ($\sum C_i G_i$) accumulated up to the date by the total credit hours ($\sum C_i$).

Both GPA and Cumulative GPA will be rounded off to the second place of decimal for reporting.

Suppose a student has completed five courses in a semester and obtained the following grades:

Course	Credits	Grade	Grade points
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ME 3101	4	A plus	4.0
ME 3102	0.75	B regular	3.0
ME 3501	3	A regular	3.75
ME 3502	0.75	B plus	3.25
ME 3401	4	A minus	3.5

Then his/her GPA for the semester will be computed as follows:

$$GPA = \frac{4(4.0) + 0.75(3.0) + 3(3.75) + 0.75(3.25) + 4(3.5)}{4 + 0.75 + 3 + 0.75 + 4} = 3.68$$

14.3 Conversion of Grade into Marks

a. Marks = $79 + 84(X - 3.75)$; $3.75 \leq X \leq 4$

b. Marks = $44 + 20(X - 2)$; $2.2 \leq X \leq 3.75$

Where X = Grade (Cumulative GPA) obtained by a student

15. Distribution of Marks

15.1 The distribution of marks for a given course will be as follows

(a) **Theory Courses:**

(i) Continuous Assessment:

Class participation and attendance 10%

Class Tests/spot tests 20%

(ii) Semester Final Examination (3 hours duration) 70%

Total = 100%

(b) **Courses on Laboratory/Sessional/Field Work:**

Class participation and attendance 10%

Quizzes/Viva Voce/Presentations 40%

Performance/Reports 50%

Total = 100%

(c) **Project and Thesis:**

Viva Voce (Conducted by a Viva Voce Committee of minimum 3 members to be constituted by the Examination Committee) 30%

Supervisor (Internal Examiner) 50%

External Examiner (any other teacher of the Department/Examination Committee) 20%

Total = 100%

15.2 Basis for distribution of marks in class participation and attendance will be as follows:

<u>Attendance</u>	<u>Percentage of Marks</u>
90% or above	10%
85% to less than 90%	9%
80% to less than 85%	8%
75% to less than 80%	7%
70% to less than 75%	6%

65% to less than 70%	5%
60% to less than 65%	4%
Less than 60%	0%

15.3 The students whose average percentage of attendance will fall short of 75% in any of the theory, lab/sessional/field work courses for which he/she has registered in one academic year shall not be eligible for the award of any type of scholarship/stipend/grant for the following academic session.

16. Class Tests, Quizzes and Spot Tests

- i. For 2, 3, and 4 credit courses 3 best out of 4 class tests may be taken for awarding marks. These may be considered as the minimum recommended number of class tests for any course. If the number of class tests administered in a course exceeds these suggested minimum numbers, then two-thirds best of all may be considered.
- ii. Duration of a class test should not exceed **15-20 minutes** and materials covered should be what were taught in 2 to 4 immediate previous classes or most recent classes.
- iii. For the convenience of conducting the class tests, one class period time slot should be kept at the first period of each working day.
- iv. The dates for the class tests shall be fixed by the Course Coordinator in consultation with the Head of the Department and shall be announced accordingly.
- v. Spot test will be considered as class test and duration of which should not exceed ten minutes. The materials covered should be what were taught in previous immediate class. The maximum number of spot test should not exceed more than four. Maximum 50% spot test will be considered.
- vi. All class tests shall ordinarily be of equal value. The result of each individual class test shall be posted for information of the students preferably before the next class test is held.
- vii. Quizzes will be held based on sessional/lab/field work classes. Duration of a quiz should not exceed one hour.

17. Earned Credits

The courses in which a student has obtained 'D' or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained 'F' grade will not be counted towards his/her earned credit calculation. A student who obtains 'F' grade in any core course in any semester, he/she will have to repeat the course. If a student obtains 'F' in an optional course he/she may choose to repeat the course or take a substitute course, if available. No 'F' grade will be counted for GPA calculation but will stay permanently on the grade sheet and transcript. When a student will repeat a review course in which he/she previously obtained 'F' grade, he/she will not be eligible to get a grade higher than B in such a course. A student obtaining D grade in a course, will be allowed to repeat the course for the purpose of grade improvement if the cumulative GPA of the student falls below 2.20. In such case, he/she will be awarded the new grade that he/she obtains or retains his/her previous grade if he/she fails.

A student obtaining 'C' or a better grade in a course will not be allowed to repeat the course for the purpose of grade improvement if cumulative GPA of the student falls below 2.20. Absence in semester final examination will result in 'F' grade unless he/she had withdrawn from the semester as per Article 12.4.

18. Measures for Helping Academically Weak Students

The minimum cumulative GPA requirements for obtaining a B.Sc. Engineering degree is 2.20. The performance of a student will be evaluated in terms of two indices, viz. semester grade point average (GPA), and cumulative grade point average (cumulative GPA).

Students will be considered to be making normal progress toward a degree if their Cumulative GPA for all courses attended is 2.20 or higher. Students who regularly maintain semester GPA of 2.20 or higher are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress will not be in good standing rather considered to be academically weak. This can happen when one or more of the following conditions exist:

- i. Semester GPA falls below 2.20 or
- ii. Cumulative GPA falls below 2.20 or
- iii. Earned credits fall below 15 times the number of semesters attended/studied

All such students can make up deficiencies in GPA and credit requirements by completing 'F' graded course(s) and repeating 'D' graded course(s) in the next semester(s). When GPA and credit requirements are fulfilled, the student is considered to be returned to good standing.

19. Honours, Dean's List and University Gold Medal

19.1 Honours

Candidates for Bachelor degree in Engineering will be awarded the degree with Honours if their cumulative GPA is 3.75 or above.

19.2 Dean's List

In recognition of excellent performance, the names of students who maintain a GPA of 3.75 or above in regular semester(s) of an academic year may be published on the Dean's List in each Faculty. In this regard Dean will give a certificate to the student confirming his name on the Dean's List. The student will be honored Tk. 2000 for his name on the Dean's List by the approval of academic council. Students who have earned 'F' grade in any course during any semesters will not be considered for Dean's List in that year.

19.3 University Gold Medal

University Gold Medal for outstanding graduates will be awarded to the students who secure the 1st position with a cumulative GPA not below 3.75 in each Department. The student must have completed his/her undergraduate course work within four consecutive academic years. Students who have earned 'F' grade in any course during any semesters will not be considered for University Gold Medal.

20. Student Classification

For several reasons, it is necessary to have a definite system by which students can be classified as First, Second, Third and Fourth Year. The students are classified according to the number of credit hours earned towards a degree. The following classification applies to the students:

<u>Year</u>	<u>Earned Credits</u>
First Year	From 0 to $< (T_1 - 8)$
Second Year	From $(T_1 - 8)$ to $< (T_2 - 12)$
Third Year	From $(T_2 - 12)$ to $< (T_3 - 16)$
Fourth Year	$\geq (T_3 - 16)$

where,

T_1 = total credits prescribed in the 1st Year 2nd Semester

T_2 = total credits prescribed up to 2nd Year 2nd Semester

T_3 = total credits prescribed up to 3rd Year 2nd Semester

21. Probation and Suspension

Students who regularly maintain semester GPA of 2.20 or above satisfying the minimum credit requirements are making good progress toward their degrees and are in good standing with the University. Students who fail to maintain this minimum rate of progress may be placed on academic probation.

The status of academic probation is a reminder/warning to the student that satisfactory progress towards graduation is not being made. A student may be placed on academic probation when either of the following conditions exist:

- i. The semester GPA falls below 2.20, or
- ii. The cumulative GPA falls below 2.20
- iii. Earned Credits fall below 15 times the number of semester attended/studied.

Students on probation are subject to such restrictions with respect to courses and extracurricular activities as may be imposed by the respective Head of the department. The minimum period of probation is one semester, but the usual period is for one academic year. This allows the academically weak student an opportunity to improve the GPA through the completing 'F' graded course(s) and repeating 'D' graded course(s) during the period. The probation may be extended for additional semesters until the student achieves an overall GPA of 2.20 or above. Once that condition is improved, the student is returned to good standing.

Academic probation is not to be taken lightly; instead to be considered very seriously. A student on academic probation who fails to maintain a GPA of at least 2.20 during two consecutive academic years may be suspended from the University. A student who has been suspended may apply for consideration to the Dean of the faculty, but this application will not be considered until the student remains suspended at least for one full semester.

Petitions for reinstatement must set forth clearly the reasons for the previous unsatisfactory academic record and it must delineate the new conditions that have been created to prevent the recurrence of such work. Each such petition is to be considered individually on its own merits.

After consideration of the petition in consultation with the student, adviser and the respective Head of the department, Dean in some cases, may reinstate the student if this is the first suspension. However, a second suspension will be regarded as final and absolute.

22. Minimum Earned Credits and GPA Requirements for Obtaining Degree

Minimum credit requirements for the award of Bachelor of Science in Engineering degree will be proposed by the Academic Committee for Undergraduate Studies (ACUG) on the recommendation of the respective faculty and approved by Academic Council. The minimum cumulative GPA requirement for obtaining a Bachelor of Engineering degree is 2.20.

A student may take additional courses with the consent of his/her adviser to raise cumulative GPA, but he/she may take a maximum of 15 such additional credits beyond respective credit requirements for B. Sc. Engineering degree during his/her entire period of study.

23. Time Limits for Completion of B. Sc. Engineering Degree

A student must complete his/her studies within a maximum period of seven academic years for engineering degree. On valid medical ground, the period may be extended by the approval of Academic Council.

24. Industrial/Professional Training Requirements

Depending on each Department's own requirements a student may have to complete a prescribed number of days for industrial/professional training in addition to minimum credit and other requirements, to the satisfaction of the concerned Department.

25. Application for Graduation and Award of Degree

A student who has fulfilled all the academic requirements for Bachelor's degree will have to apply to the Controller of examination through his/ her Advisor by the approval of Head of the Department for graduation. Provisional degree will be awarded on completion of Credit and GPA requirements. Such Provisional degrees will be confirmed by the Academic Council.

26. Absence during Semester

A student should not be absent from lab/sessional, quizzes, class tests, class participation, attendance, etc. during the semester. Such absence will naturally lead to reduction in grade points/marks, which count towards the final grade. Absence in semester final examination will result in 'F' grade.

27. Review Courses

- i. Students obtained 'F' Grade in theory course having registered previously will get opportunity for registration of one course in each semester as review. One will be allowed to sit for the review course examination without making any change of previously obtained class test and class performance and attendance marks.
- ii. Review course examination will be conducted separately at the end of the regular semester.
- iii. Any student who has failed in any sessional course(s) he may be allowed to complete the course(s) by attending the sessional classes with the students of next regular semester(s).

28. Special Examination

A special examination on 'F' graded course(s) may be conducted for the outgoing students who have a maximum of 2 (two) 'F' graded theory courses for completion of degree. The special examination will be arranged at a convenient time by the Controller of Examination within 8 weeks after the publication of results of the 4th year 2nd semester regular examination. If a student repeats 'F' graded theory course(s) in special examination, he/she will not be eligible to get a grade higher than B in such course(s). A student who has failed in the special examination may register the course(s) in the regular semester.