

University of

RAJSHAHI



**FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING**

**Syllabus for
B.Sc. in Civil Engineering
Session 2017-2018**

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University of Rajshahi
Faculty of Engineering
Department of Civil Engineering
Syllabus for Bachelor of Science in Civil Engineering
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Civil Engineering is a professional engineering discipline that deals with the design, construction and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams and buildings. Civil Engineering is the second-oldest engineering (Ref: Wikipedia) discipline after Military Engineering which is defined to distinguish Non-military Engineering from Military Engineering. It is traditionally broken into several sub-disciplines including Architectural Engineering, Environmental Engineering, Geotechnical Engineering, Control Engineering, Structural Engineering, Earthquake Engineering, Transportation Engineering, Forensic Engineering, Urban Engineering, Water Resources Engineering, Materials Engineering, Wastewater Engineering, Offshore Engineering, Facade Engineering, Coastal Engineering, Quantity Surveying. Civil Engineering takes place in the public sector from municipal through to Local & National Governments and in the private sector from individual homeowners through to International companies. In other words, it is highly demanded in all those mentioning fields and its graduates are highly sought after by potential employers.

Objectives of Civil Engineering program:

- ❖ To become a critical thinker and problem solver based on a fundamental knowledge of humanities, social sciences, mathematics, science, engineering science and a broad range of civil engineering technical areas;
- ❖ To produce technically qualified Civil Engineers to become leaders of Civil and Construction Industries who are committed to sustainable development of Civil and Construction site for the betterment of society and nation;
- ❖ Consideration of global and societal concerns, ethics and sustainability when making engineering decisions;
- ❖ Pursuit of life-long learning and professional development.

Methods of Instructions and Learning Environment:

This shall comprise the following:

- ❖ Class rooms with lectures, demonstrations and relevant handouts;
- ❖ Giving useful assignments related to the subjects requiring use of reference material and internet facility;
- ❖ Term projects and often class presentation;
- ❖ Laboratory experiments, field work and visit, industrial visit and design exercises;
- ❖ Extension lectures and class room discussions by renowned professionals;
- ❖ The note books/field work/graphs and drawing sheets pertaining to the field work and practical should be completed within a time period and submitted with this specific time

to the teacher. In case of field visit the students shall be required to write a visit report which shall be graded later by the teacher.

Expected Outcomes:

The courses of Bachelor of Science in Civil Engineering program at the University of Rajshahi are designed to emphasize on a strong foundation in Physics, Mathematics, Statics, Dynamics and Chemistry followed by a through coverage of basic Civil Engineering courses such as Engineering Mechanics, Engineering Materials, Details of Construction, Design of Concrete and Steel Structures, Fluid Mechanics, Irrigation and Flood Control Engineering, Environmental Engineering, Transportation Engineering, Geotechnical Engineering, Structural Analysis and Design, Hydraulics etc. so that they can

- ❖ Able to undertake planning, design, construction, operations and maintenance of urban and rural infrastructure by applying his/her knowledge in all stages of Civil Engineering and inter disciplinary projects.
- ❖ Able to acquire and apply knowledge of Mathematics, basic Science and Engineering fundamentals to solve complex Civil and Construction Engineering problems;
- ❖ Able to utilize the system and find out proper solution to make it sustainable for public health and safety, cultural, social and environmental considerations;
- ❖ Able to investigate and solve complex problems using research knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusion in complex Structural Design of buildings and bridges;
- ❖ Able to apply reasoning based on contextual knowledge in professional engineering practice to assess social, health, safety, legal and cultural issues and the consequent responsibilities;
- ❖ Able to communicate effectively on difficult engineering activities, not only with the engineers but also with the community at large;
- ❖ Able to function effectively as an individual and in group with the capacity to be a leader or member in multi-disciplinary settings;
- ❖ Able to recognize the need to undertake independent and life-long learning in continual technological development;
- ❖ Able to apply knowledge of engineering, business acumen, management principles and entrepreneurship in multidisciplinary environments as a member and leader in a team.

The courses designed for B.Sc. in Civil Engineering consist of 4000 marks of 160 credits distributed over eight semesters in four academic years. Each academic year is divided into two semesters (odd & even) each of duration not less than 11 weeks (66 working days). There shall be final examinations at the end of each semester. The medium of answer in all examinations will be either Bangla or English, but not the mixer of both. The theoretical examination of courses less than or equal to 2 credits shall be of 2 hours duration and courses greater than 2 credits shall be of 3 hours duration. An academic schedule for an academic year shall be announced for general notification before the start of the academic year, on the prior approval of the academic committee.

1.Attendance (Ref. The Rajshahi University Academic Ordinance, 2013 for B.Sc. in Engineering Curriculum of the Affiliated Colleges/Institutes, article no: 13):

- 1.1 In order to be eligible for appearing, as a regular candidate, at the semester final examinations, a student shall be required to have attended at least 70% of the total number of periods of lectures/tutorials/laboratory classes held during the semester in every **course** as defined in the curricula. The laboratory courses mean all laboratory/project/fieldwork/in-plant training and any other similar courses.
- 1.2 A student whose attendance falls short of 70% but not a below 60% in any **course** as mentioned above may be allowed to appear at the final examinations as **non-collegiate** student and **he/she shall not be eligible for the award of any scholarship or stipend**. A student, appearing at the examination under the benefit of this provision shall have to pay, in addition to the regular fees, the requisite fine prescribed by the syndicate for the purpose.
- 1.3 The **Courses** mentioned above shall mean a **course** of study as described in the curricula and it may be a theoretical or a laboratory **course**.
- 1.4 Students having **less than 60% attendance** in lecture/tutorial/ laboratory of **any course will not be allowed to appear** at the final examinations of these semester.
- 1.5 An attendance report of the students shall be prepared by the concerned course teacher for his/her Class. The report will be posted for information of the students to **the Chairman of concerned department** within three days of the last class of the course. Awarded marks for class attendance of the students will be posted in the prescribed marks sheet. A copy of that marks sheet will send to the chairman of the examination committee and to the controller of examinations as well in sealed envelope.

The basis of awarding marks for class participation and attendance is shown in Table-1.

Table-1: Distribution of Marks in Attendance

Attendance	Marks%	Remarks
90% and above	100	Regular
85% to less than 90%	90	
80% to less than 85%	80	
75% to less than 80%	70	
70% to less than 75%	60	
65% to less than 70%	50	Non-collegiate
60% to less than 65%	40	
less than 60%	00	

(Ref. The Rajshahi University Academic Ordinance, 2013 for B.Sc. in Engineering Curriculum of the Affiliated Colleges/Institutes, article no: 13), unit=100 marks.

2. The Grading System

The letter grade system shall be used to assess the performance of the students as shown in Table-2 (Ref. The Rajshahi University Academic Ordinance, 2013 for B.Sc. in Engineering Curriculum of the Affiliated Colleges/Institutes, Article no. 14.1):

Table-2: Letter Grade System

Numerical grade	Letter Grade (LG)	Grade point (GP) (G _i)	Credit (C _i)
80% or above	A+	4.00	4.00
75% to less than 80%	A	3.75	4.00
70% to less than 75%	A-	3.50	4.00
65% to less than 70%	B+	3.25	4.00

60% to less than 65%	B	3.00	4.00
55% to less than 60%	B-	2.75	4.00
50% to less than 55%	C+	2.50	4.00
45% to less than 50%	C	2.25	4.00
40% to less than 45%	D	2.00	4.00
less than 40%	F	0.00	4.00
Incomplete	I	0.00	4.00

A letter grade 'I' ((incomplete) shall be awarded for courses in the odd semester which continue through to the even semester.

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

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i} \quad (\text{i})$$

Where, n is the number of courses offered during the semester, C_i is the number of credits allotted to the i -th course and G_i is the grade point earned for that course.

Illustration: Suppose a student obtained following grade in Part-1 odd semester:

Code No	Subject	Credit	Letter Grade	GP
PHY 1111	Physics-1	4	C	2.25
CHEM 1113	Chemistry-1	4	A+	4.00
MATH1115	Mathematics-1	4	B-	2.75
TE 1111	Introduction to Textile Engineering	6	B+	3.25
CE 1112	Engineering Drawing	2	A+	4.00

Therefore, GPA in the part-1 odd semester=

$$\frac{4(2.25)}{22}$$

And let's assume that his/her GPA in Part-1 even semester is 3.130

A **Yearly Grade Point Average (YGPA)** shall be calculated for each academic year as follows:

$$\text{YGPA} = \frac{\sum_{j=1}^2 C_j G_j}{\sum_{j=1}^n C_j} \quad (\text{ii})$$

Therefore, YGPA of part-1 Examination =

So, the YGPA is 3.152. (As per Ref. AC#242, Agendum 49, Syndicate 468 date: 08/10/2016 both GPA and YGPA will be calculated upto 3 digits after the decimal point without any rounding.)

The **Cumulative Grade Point Average (CGPA)** gives the cumulative performance of students from the first year upto the end of the fourth year to which it refers, and will be calculated as follows:

$$CGPA = \frac{\sum_{k=1}^m C_k G_k}{\sum_{k=1}^m C_k} \quad (\text{iii})$$

where, m is the total number of years being considered, C_k is the total number of credits registered during the k-th year and G_k is the YGPA earned in that particular year.

Similarly let us assume that, the YGPA of the student for the all 4 Parts are as follows:

Year	Credit	YGPA
Part-I	40	2.770
Part-II	40	3.470
Part-III	40	2.960
Part-IV	40	3.330

Then his/her CGPA of four academic years is

$$\text{Therefore, CGPA} = \frac{40(2.77) + 40(3.47) + 40(2.96) + 40(3.33)}{40 + 40 + 40 + 40} = 3.13$$

(CGPA will be rounded off upto the second place of decimal for reporting. If the 3rd digit is greater than equal to 5, the second digit will be rounded up. Again, if the 3rd digit is less than 5 it will be discarded. For instance, CGPA= 2.212 shall be rounded as CGPA=2.21. However, if the CGPA is 2.215 it shall be rounded up as 2.22).

3. Earned Credit

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

4. Marks and Credits distribution for B.Sc. in Civil Engineering

The distribution of marks and credits in various Definitions of Disciplines in the ordinance for B.Sc. Engineering Degree in the Department of Civil Engineering are given in Table-3 [Ref. The Rajshahi University Academic Ordinance, 2013 for B.Sc. in Engineering Curriculum of the Affiliated Colleges/Institutes, Article no 6.1]

Table-3: Marks and Credits distribution in discipline for B.Sc. in Civil Engineering

Course Type		Marks	Marks (%)	Credits
^a Humanities		175	4.375	7
^b Basic Sciences (with Lab)		700	17.50	28
Engineering		3125	78.125	125
Distribution	a. Theoretical	2875	75.163	115
	b. Board Viva-Voce	150	3.925	6
	c. Laboratory	800	20.915	32
Total		4000	100	160

^aEach department must include course on English.

^bEach department must include courses on Physics, Chemistry and Mathematics.

If a student fail in any subject with a code and the code of same subject has been changed later, then he/she can give the exam with his/her previous code(question will be same with both codes)

Table-4: Distribution of Marks (as per course types)

1.	Theoretical Courses:	
	Class Attendance	10%
	Quizzes/Class Test	20%
	Semester Final Examination	70%
	Total	100%
2.	Laboratory/Sessional/Design/Field Work*:	
	Class Attendance	10%
	Quizzes and Viva-Voce (Conducted by the Department)	30%
	Practical/Design Work/Report	60%
	Total	100%
3.	Project Work	
	Internal Examiner (Supervisor) (Based on performance, regularity, quality of analysis, design, organization, writing style)	35%
	External Examiner (Any teacher from the panel of examiners) (Based on quality of analysis, design, organization, writing style)	35%
	Presentation and oral Examination	30%
	Total	100%

5. Courses offered to the undergraduate students of Civil Engineering Department for B.Sc. Engineering Degree (Session 2017-2018)

Part-1 Odd Semester

Course No.	Course Title	Credit	Contact hours/week
PHY1121	Physics-I	3	3
CHEM1123	Chemistry-I	3	3
MATH1125	Differential and Integral Calculus	3	3
CE1101	Surveying	3	3
HUM1127	English	2	2
PHY1122	Physics Sessional-I	0.75	1.5
CHEM1124	Chemistry Sessional-I	0.75	1.5
CE1100	Civil Engineering Drawing-I	1.5	3
ME1102	Workshop Practice	1.5	3
Total		18.5	23

No. of Theory Courses: 05
 No. of Sessional Courses: 04

Total Credits: 18.5
 Total Contact Hours: 23.0

Part-1 Even Semester

Course No.	Course Title	Credit	Contact hours/week
PHY1221	Physics-II	3	3
CHEM1223	Chemistry-II	3	3
MATH1225	Matrices and Geometry	3	3
CE1211	Engineering Mechanics	3	3
EEE1221	Basic Electrical Engineering	3	3
PHY1222	Physics Sessional-II	0.75	1.5
CHEM1224	Chemistry Sessional-II	0.75	1.5
CE1200	Civil Engineering Drawing-II	1.5	3
CE1202	Surveying Field Work	1.5	(2 weeks)
Total		19.5	24

No. of Theory Courses : 05
 No. of Sessional Courses: 04

Total Credits: 19.5
 Total Contact Hours: 24

* CE 1202 Surveying field work may be conducted at a suitable time within the Part-1 period depending upon weather condition.

Part-2 Odd Semester

Course No.	Course Title	Credit	Contact hours/week
CE2103	Engineering Materials	3	3
CE2111	Mechanics of Materials-I	3	3
CE2121	Fluid Mechanics	4	4
MATH2125	Differential equation	3	3
HUM2127	Sociology and Government	2	2
CE2104	Engineering Materials Sessional	1.5	3
CE2110	Details of Constructions	1.5	3
CE2122	Fluid Mechanics Sessional	1.5	3
Total		19.5	24

No. of Theory Courses: 05
No. of Sessional Courses: 03

Total Credits: 19.5
Total Contact Hours: 24.0

Part-2 Even Semester

Course No.	Course Title	Credit	Contact hours/week
CE2205	Numerical Methods and Computer Programming	3	3
CE2207	Geology and Geomorphology	2	2
CE2211 Prereq. CE2111	Mechanics of Materials-II	3	3
MATH2225	Vector analysis, Laplace transformation and Statistics	3	3
HUM2227	Accounting and Economics	3	3
CE2206	Numerical Methods and Computer Programming Sessional	1.5	3
CE2208	Details of Estimating	1.5	3
CE2212	Mechanics of Materials-II Sessional	1.5	3
Total		18.5	23
CE2260	Board Viva-Voce	1.5	-

No. of Theory Courses: 05
No. of Sessional Courses: 03

Total Credits: 20.0
Total Contact Hours: 23.0

Part-3 Odd Semester

Course No.	Course Title	Credit	Contact hours/week
CE3111 Prereq. CE2111	Structural Analysis and Design-I	3	3
CE3113 Prereq. CE2211	Reinforced concrete-I	3	3
CE3121 Prereq. CE2121	Engineering Hydraulics	4	4
CE3131	Geotechnical Engineering-I	3	3
CE3141	Environmental Engineering-I	3	3
CE3112	Structural Analysis and Design Sessional-I	1.5	3
CE3122	Engineering Hydraulics Sessional	1.5	3
CE3132	Geotechnical Engineering Sessional-I	0.75	1.5
CE3142	Environmental Engineering Sessional-I	0.75	1.5
Total		20.5	25

No. of Theory Courses: 05
No. of Sessional Courses: 04

Total Credits: 20.5
Total Contact Hours: 25.0

Part-3 Even Semester

Course No.	Course Title	Credit	Contact hours/week
CE3211 Prereq. CE3111	Structural Analysis and Design-II	3	3
CE3213 Prereq. CE3113	Reinforced concrete-II	3	3
CE3223	Hydrology	3	3
CE3231 Prereq. CE3131	Geotechnical Engineering-II	3	3
CE3251	Transportation Engineering-I	3	3
CE3214	Structural Analysis and Design Sessional-II	1.5	3
CE3232	Geotechnical Engineering Sessional-II	0.75	1.5
CE3252	Transportation Engineering Sessional-I	0.75	1.5
Total		18	21
CE3260	Board Viva-Voce	1.5	-
CE3200	Industrial Training	0	2 weeks

No. of Theory Courses: 05
No. of Sessional Courses: 03

Total Credits: 19.5
Total Contact Hours: 21.0

Part-4 Odd semester

Course No.	Course Title	Credit	Contact hours/week
CE4111 Prereq. CE3211	Structural Analysis and Design-III	4	4
CE4121 Prereq. CE3121	Irrigation, Flood mitigation and Management	3	3
CE4131 Prereq. CE3231	Geotechnical Engineering-III	3	3
CE4141 Prereq. CE3141	Environmental Engineering-II	3	3
CE4151 Prereq. CE3251	Transportation Engineering-II	3	3
CE4100 *	Project and Thesis	1.5	3
CE4112	Structural Analysis and Design Sessional-III	1.5	3
CE4142	Environmental Engineering Sessional-II	0.75	1.5
CE4152	Transportation Engineering Sessional-II	0.75	1.5
Total		20.5	25

No. of Theory Courses: 05
No. of Sessional Courses: 04

Total Credits: 20.5
Total Contact Hours: 25.0

* The credit of this course will be assigned at the end of Part-4 Even Semester

Part-4 Even Semester

Option	Course No.	Course Title	Credit	Contact hours/week
C-1	CE4201	Project planning and Construction Management	3.00	3
	CE4210	Structural Analysis & Design Sessional-IV	1.5	3
Op-1	CE4211	Pre-Stressed Concrete	2.00	2
	CE4213	Theory of Elasticity and Elastic Instability of Structures	2.00	2
	CE4215	Finite Element Method	2.00	2
	CE4217	Design of steel Structures	2.00	2
	CE4212	Structural Analysis and Design Sessional-V	1.50	3
Op-2	CE4221	River Engineering	2.00	2
	CE4223	Ground Water Engineering	2.00	2
	CE4225	Hydraulic Structures	2.00	2
	CE4227	Coastal Engineering	2.00	2
	CE4220	Water Resources Engineering Sessional	1.5	3
Op-3	CE4231	Geotechnical Engineering-IV	2.00	2
	CE4233	Geotechnical Engineering-V	2.00	2
	CE4235	Geotechnical Engineering-VI	2.00	2
	CE4232	Geotechnical Engineering Sessional-III	1.50	3
Op-4	CE4241	Solid waste Management	2.00	2
	CE4243	Environmental Development project	2.00	2
	CE4245	Environmental Pollution Control	2.00	2
	CE4240	Environmental Engineering Sessional-III	1.50	3
Op-5	CE4251	Transportation Engineering–III	2.00	2
	CE4253	Transportation Engineering–IV	2.00	2
	CE4255	Transportation Engineering–V	2.00	2
	CE4250	Transportation Engineering Sessional–III	1.50	3
C-2	CE4200	Project and Thesis	3.00	6
	CE4260	Board Viva-Voce	2.00	-
	CE4270	Seminar	2.00	4
Total =			22.0	31

N.B. ‘C-1’ and ‘C-2’ are Compulsory courses. ‘Op-1’ to ‘Op-5’ are Optional courses. Students must take the compulsory courses. Students shall take *three optional theory courses* and *three sessional* from optional groups of ‘Op-1’ to ‘Op-5’.

No. of Theory Courses: 04
No. of Sessional Courses: 04

Total Credits: 22
Total Contact Hours: 31

6. Types of Courses

The courses included in undergraduate curricula are divided into several groups as follows:

6.1 Core Courses

In each discipline a number of courses will be identified as core courses which form the nucleus of the respective bachelor's degree programme. A student has to complete all of the designated core courses for his discipline.

6.2 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 Terms.

6.3 Optional Courses

Apart from the core courses, students will have to complete a number of courses which are optional in nature in that students will have some choice to choose the required number of courses from a specified group/ number of courses.

7. Course Offering and Instruction

The courses to be offered in a particular term will be announced and published in the Course Catalogue along with a tentative Term Schedule before the end of the previous term. Whether a course is to be offered in any term will be decided by the respective BUGS. Respective departments may arrange to offer one or more pre-requisite or core courses in any term depending on the number of students who dropped or failed the course in the previous term.

8. **Rules for Promotion** (Ref. The Rajshahi University Academic Ordinance, 2013 for B.Sc. in Engineering Curriculum of the Affiliated Colleges/Institutes, Article no. 15):

- 8.1 The academic year shall be divided into two semesters each having duration of not less than 11 teaching weeks (details are given in Section 7 of the Ordinance).
- 8.2 There shall be final examinations conducted by the concerned Examination Committee of the Departments at the end of each semester.
- 8.3 The results shall be finalized at the end of the even semester of the academic year. A student entering in an odd semester **shall automatically move** on to the next semester, unless he/she was **barred** from appearing at the final examinations at the end of the semester. Individual **course** grades and **GPA** shall be announced within a date ordinarily not later than three weeks after the end of the semester final examinations.
- 8.4 **Minimum passing grade:** The minimum passing grade in a theoretical course will be D and the minimum passing grade in a laboratory/project/field work/in-plant training/workshop/similar Courses (henceforth referred to as laboratory course) and **Viva voce** will be C.
- 8.5 **Promotion to higher class:** In order to be promoted to higher class a student must obtain the following requirements:
 - i) Yearly Grade Point Average (YGPA) of 2.25 or higher
 - ii) Credit point loss (F or I Grade) in the theoretical courses not more than 10.
 - iii) Minimum C grade in the laboratory courses and viva-voce.

- 8.6 **Course Improvement:** A promoted student may appear for course improvement in the immediate next academic year for maximum 10 credit points to clear his/her F grade or to improve the grades on the courses in which less than B grade (including those of F grade) was obtained in Part-1, Part-2 and Part-3 examinations. In such case, the student has to give his/her choice of course/courses for course improvement in writing. If the student fails to clear his/her F grades in the first attempt, he/she shall get another (last) chance in the immediate next year to clear the F grades. In the case of student's failure to improve his/her course grade at the course improvement examination, the previous grade shall remain valid.
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- 8.7 **Course Exemption:** Students who fail to be promoted to the next higher class shall be exempted from taking the theoretical and laboratory courses where they obtained grades **equal to B or above**. These grades would be counted in calculating GPA in the next year's examination results.
- 8.8 **Merit Position:** The YGPA obtained by a student in the **semester final examinations** will be considered for determining the **merit position for the award of scholarships, stipends etc.**
9. **Publication of Results:** (Ref. The Rajshahi University Academic Ordinance, 2013 for B.Sc. in Engineering Curriculum of the Affiliated Colleges/Institutes, Article no. 17):
- 9.1 **Award of degree:** In order to qualify for the B.Sc. Engg. degree, a student must have to **earn minimum 150 credits and a minimum CGPA of 2.25 within a maximum of six academic years**. The result will be published in accordance with merit.
- 9.2 **Honours:** Candidates for Bachelor degree in engineering will be awarded the degree with Honours if their earned credit is 160 and **CGPA is 3.75 or higher**.
- 9.3 **Result Improvement:** A candidate obtaining B.Sc. Engr. within 4 or 5 academic years shall be allowed to improve his/her result, of maximum of 10 credit points (courses less than 'B' grade) of the Part-IV theoretical courses in the immediate next regular examination after publication of his/her result. No improvement shall be allowed for laboratory examinations and Board Viva-voce. If a candidate fails to improve CGPA with the block of new GP in total, the previous results shall remain valid.
- 9.4 **Readmission and Course Exemption:** If a student fails to obtain the degree within 4 or 5 academic year, he/she will be readmitted in Part-4 and will appear for the exam according to the clause 15.6. Course exemption rules will also be valid according to clause 15.7.
- 9.5 **Dean's List:** As a recognition of excellent performance, the names of students obtaining a cumulative GPA of 3.75 or above in two regular semesters in each academic year may be published in the Dean's List in the faculty. Students who have received '**F**' grade in any course during any of the two regular semesters will not be considered for Dean's List in that year.
- 9.6 **Recording of Result:** The transcripts in English will show the course number, course title, credit, letter grade, grade point of individual courses, YGPA of each year, and finally, CGPA.

10. Eligibility for Examination:

- 10.1 A candidate may not be admitted to any semester final examinations unless he/she has
- 10.1.1 Submitted to the registrar/ Vice-Chancellor an application in the prescribed form for appearing at the examination.
 - 10.1.2 Paid the prescribed examination fees, and all outstanding college/institute dues.
 - 10.1.3 Fulfilled the conditions for attendance in class and
 - 10.1.4 Been barred by any disciplinary rule.
- 10.2 On special circumstances the Vice- Chancellor may permit a student to appear at the examination.
- 10.3 A student whose attendance falls short of 70% but not below 60% in any course as mentioned above may be allowed to appear at the final examinations as a non-collegiate student.

Details of course outline of each subject for Bachelor of Science in Civil Engineering

Part-1 Odd Semester

PHY1121 Physics-I

Credit: 3.00

Contact Hours/week: 3.0

Section-A

Physical optics: Theories of light: Huygen's principle and construction. Interference of light: Young's double slit experiment, Fresnel and Fraunhofer diffraction, diffraction by single slit, diffraction by double slit, diffraction gratings. Polarization of light: production and analysis of polarized light, optical activity, optics of crystals.

Heat and Thermodynamics: Temperature, zeroth law of thermodynamics. Thermometers, constant volume, platinum resistance and thermocouple. First law of thermodynamics and its application, molar specific heats of gases, isothermal and adiabatic relations, work done by a gas. Kinetic theory of gases: explanation of gas laws, kinetic interpretation of temperature, equipartition of energy and calculation of ratio of specific heats, mean free path, Vander Waals equation of state, second law of thermodynamics: reversible and irreversible processes, Carnot's cycle, efficiency, Carnot's theorem, entropy.

Section-B

Waves and Oscillations: Oscillations: Simple harmonic motion, damped simple harmonic oscillations, forced oscillations, resonance, vibrations of membranes and columns. Combination and composition of simple harmonic motions, Lissajous figures. Transverse and longitudinal nature of waves, travelling and standing waves, intensity of waves, energy calculation of progressive and stationary waves, phase velocity, group velocity. Sound waves: velocity of longitudinal wave in a gaseous medium and Doppler effect. Architectural acoustics: Sabine's formula, requirements of a good auditorium.

CHEM1123 Chemistry-I

Credit: 3.00

Contact Hours/week: 3.0

Section-A

Atomic structure & Periodic table: chemical bonds, chemistry of cement, silicates and limes. Physical and chemical properties of water. Different types of solutions, concentration units, Chemical equilibrium.

Section-B

Reactions kinetics: rate of chemical reactions, order and molecularity of reactions, different types of rate expression, methods of determining rate and order, effect of temperature on reaction rate and energy of activation.

Colloid and colloidal solution: classification, preparation, purification, properties, protective action and application of colloids.

MATH1125 Differential and Integral Calculus

Credit: 3.00

Contact Hours/week: 3.0

Section-A

Differential Calculus: Limit continuity and differentiability, n-th derivatives of standard functions. Leibnit'z theorem, Rolle's theorem and Mean value theorem. Expansion in finite and infinite forms, indeterminate form and partial differentiation. Euler's theorem. Tangent and normal. Subtangent and subnormal in partial and polar co ordinates. Maxima and minima of functions of single variables. Curvature.

Section-B

Integral Calculus: Integration by parts. Standard integral. Integration by the method of successive reduction. Definite integrals, improper integrals. Beta function. Gamma functions. Multiple integrals. Area, Volume of solids of revolution.

CE1101 Surveying

Credit: 4.00

Contact Hours/week: 3.0

Section-A

Introduction, linear measurement, Chain survey, Traverse survey and Plane table survey. Leveling and contouring, Calculation of areas and volumes, problems on heights and distances,.

Section-B

Curves and curve ranging. Tacheometry: Introduction, principles and problems on tacheometry. Astronomical surveying: Definition, instruments, astronomical correction and systems of time. Photogrammetry: Introduction to terrestrial photography, reading of photo mosaic and scale. Project surveying, Errors in surveying, Remote sensing and Introduction to Global Positioning System (GPS).

HUM1127 English

Credit: 2.00

Contact Hours/week: 2.0

Section-A

English phonetics: the places and manners of articulation of the English sounds. Vocabulary. English grammar Construction of sentences, some grammatical problems. Phrases and idioms.

Section-B

Comprehension. Composition on current affairs. Amplification, precis writing, Commercial correspondence and tenders. Technical report writing, Lessons in spoken English, Drafting notes. - Short stories written by some well-known classic writers.

PHY1122 Physics Sessional-I

Credit: 0.75

Contact Hours/week: 1.5

Determination of the frequency of a tuning fork by Melde's apparatus. Determination of the focal length of concave lens by auxiliary lens method. Determination of the refractive index of the material of a prism using spectrometer. Determination of the spring constant and the effective mass of a loaded spring. Determination of the specific heat of a liquid by the method of cooling. Determination of the thermal conductivity of a bad conductor by Lee's method. Determination of the pressure coefficient of air by constant volume air thermometer.

CHEM1124 Chemistry Sessional-I

Credit 0.75

Contact Hours/week: 1.5

Volumetric analysis: acid-base titration, oxidation-reduction titration salts analysis (qualitative).

CE1100 Civil Engineering Drawing-I

Credit: 1.50

Contact Hours/week: 3.0

Introduction, lettering, numbering and heading, Plane geometry: pentagon, hexagon, octagon, ellipse, parabola, hyperbola. Projection (Solid Geometry): cube, triangular prism, square prism, pentagonal prism, hexagonal prism, cone and cylinder. Development: cube, pyramid, cone and prism. Section and true shape: cube, pyramid, cone prism. Isometric drawing: cube, pyramid and cone. Oblique drawing: cube, pyramid and cone. Interpretation of solids: Plan, elevation and section of single-storied buildings.

ME 1102 Workshop Practice

Credit: 1.50

Contact Hours/week: 3.0

Carpentry shop (3/2 hr/week):

Wood working tools, Wood working machine: Band saw, scroll saw, circular saw, jointer, thickness planer, disc sander, wood lathe. Type of sawing, common cuts in wood works, types of joints. Defects of timber: natural defects and artificial defects. Seasoning, preservation, substitute of timber, commercial forms of timber. Characteristics of good timber. Use of fastening, shop practice, practical job, planning and estimating of a given job.

Machine shop (3/4 hr/week):

Kind of tools: common bench and hand tools, marking and layout tools, measuring tools, cutting tools, machine tools, bench work with jobs. Drilling, Shaper and Milling machines: introduction, type, size and capacity, uses and applications.

Welding shop (3/4 hr/week):

Methods of metal joints, Riveting, grooving soldering, Welding: types of welding joints and welding practice, position of arc welding and polarity: flat, vertical, horizontal and overhead. Electric arc welding and its machinery, welding of different types of material, low carbon steel, cast iron, brass, copper, stainless steel, aluminum. Types of electrode, fluxes and their composition. Arc welding defects, Test of arc welding. visual destructive and non-destructive tests. Types of gas welding system and gas welding equipment. Gases and types of flame, welding of different type of materials. Gas welding defects, test of gas welding.

Part-I Even Semester

PHY1221 Physics-II

Credit: 3.00

Contact Hours/week:3.0

Section A

Structure Matter: States of matter: Solid, liquid and gas. Classification of solids: amorphous, crystalline, ceramics and polymers. Atomic arrangement in solids. Different types of bonds in solids: Metallic. Vander Waals, covalent and ionic bond, packing in solids, interatomic distances and forces of equilibrium, x-ray diffraction. Bragg's law. plasticity and elasticity. Distinction between metal, insulator and semi conductor.

Electricity and Magnetism: Electric charge, Coulomb's law, the electric field electric flux and Gauss's law, some application of Gauss's law, electric potential V, relation between E and V, electrical potential energy. Capacitors, capacitance, dielectrics: an atomic view. dielectrics and Gauss' law.

Section B

Current and resistance: Current and current density, Ohm's law, Ampere's law, Faraday law, Lenz's law, self-inductance and mutual inductance. Magnetic properties of matter: magnetomotive force, magnetic field intensity, permeability, susceptibility, classifications of magnetic materials, magnetization curves.

Modern Physics: Michelson Morley's experiment, Gallilean transformation, special theory of relativity, Lorentz-transformation, relative velocity, length contraction, time dilation, mass energy relation. Photoelectric effect, Compton effect, De-Broglie wave, Bohr's atom model. Nuclear Physics: Radioactive decay, half life, mean life, isotopes, nuclear binding energy, alpha, beta and gamma decay.

CHEM1223 Chemistry-II

Credit: 3.00

Contact Hours/week: 3.0

Section A

Chemical corrosion: Introduction to chemical corrosion, corrosion of metals and alloys in dry and wet environments, mechanism of Corrosion, atmospheric and soil corrosion, building corrosion and their protective measures.

Chemistry of Environmental Pollution: Environment and its characteristics, chemistry of toxic metal and non-metal pollutants, analytical techniques used in the determination of pollutants, chemical concept of DO, BOD, COD and threshold odor number, chemistry involved in water treatment plants, quality of industrial waste water.

Section B

Polymers: Chemistry of polymerization different types of polymers and their properties. Polymers-degradation, elastomers and composite materials.

Paints and varnishes: Introduction to paints and varnishes, pre treatment of the surface, metallic, non metallic and organic protective coating, types of paints and their uses.

Principle of spectrophotometric analysis: Beer Lambert law and its applications.

Thermo-chemistry: Laws of thermo-chemistry and problems based on them, kirchoffs equation, Heat of solution and heat of neutralization.

MATH1225 Matrices and Geometry

Credit: 3.00

Contact Hours/week: 3.0

Section A

Matrices: Definition of matrix, Algebra of matrices. Multiplication of matrices. Transpose of a matrix and inverse of a matrix. Rank and elementary transformation of matrices, Solution of linear equations, linear dependence and independence of vector. Quadratic forms. Matrix polynomials Determination of characteristic roots and vectors. Null space and nullity of a matrix. Characteristic subspace of a matrix.

Section B

Two and three-dimensional Co-ordinate Geometry: A pair of straight lines and conic section in two dimensions. System of co-ordinate, Projection. Direction Cosines, Equations of planes and lines. Angle between lines and planes. Distance from a point to a plane. Co-planar lines. Shortest distance between two given straight lines. Standard equation of conicoids, sphere ellipsoid. Hyperboloid of one sheet, hyperboloid of two sheets, Tangent planes, Normal lines, Condition of tangency.

CE1211 Engineering Mechanics

Credit: 3.00

Contact Hours/week: 3.0

Section A

Introduction to SI units, coplanar concurrent forces, moments and parallel coplanar forces, non-concurrent non-parallel coplanar forces, Friction, centroids, moment of inertia of areas, moment of inertia of masses,

Section B

Analysis of simple truss, non-coplanar forces, flexible chords, plane motion, force systems that produce rectilinear motion, work, kinetic energy, power, impulse and momentum.

EEE1221 Basic Electrical Engineering

Credit: 3.00

Contact Hours/week: 3.0

Section A

Electrical units and standards. Electrical networks, series, parallel and series-parallel networks. Method of network analysis. Measurement of electrical quantities, resistance, current, voltage, power and energy measurements.

Introduction to electronic principles and its simple applications. Introduction to electrical wiring.

Section B

Alternating current: Instantaneous, rms and average values of current and voltage. Real and reactive power. Steady AC circuit analysis, single phase RLC circuit with sinusoidal excitation. Polyphase circuit, Balanced three phase circuit, Familiarization with different types of electrical machines, DC generators and motors, AC generators and motors and transformers.

PHY1222 Physics Sessional-II

Credit: 0.75

Contact Hours/week: 1.5

Determination of the radius of curvature of a plano-convex lens by Newton's ring method. Determination of the specific rotation of sugar solution by a polarimeter. Determination of the temperature coefficient of the resistance of the material of a wire. Measurement of unknown resistance and verification of the laws of resistance by P.O. (post office) box. Comparison of the E.M.F's of two cells by potentiometer. To plot thermoelectromotive force-temperature (calibration) curve for a given thermocouple. Determination of the melting point of a solid using the calibration curve.

CHEM1224 Chemistry Sessional-II

Credit: 0.75

Contact Hours/week: 1.5

Gravimetric analysis: determination of Fe, Cu, Ca, Cl, SO₄ Volumetrically spectrophotometric estimation of As, Cr, Mn, Ca, Fe, Ni, Zn. Determination of pH of a solution.

CE1200 Civil Engineering Drawing-II

Credit: 1.50

Contact Hours/week: 3.0

Plan, elevation and sections of multi-storied buildings, reinforcement details of beams, slabs, stairs etc. Plan and section of septic tank, detailed drawing of roof truss, plan, elevation and sections of culverts, bridges and other hydraulic structures, building services drawings, introduction to computer aided drafting.

CE1202 Surveying Field Work

Credit: 1.50

Duration: 2 weeks

Chain survey; Traverse survey by Prismatic Compass/compact Compass; Plane table survey; Leveling and Contouring; Route project survey; Master plan, House setting; Curve setting; Stadia surveying; Problems on Height and Distance.

N.B: Surveying Field work may be conducted at a suitable time within 1st year period depending upon weather.

Part-II Odd Semester

CE2103 Engineering Materials

Credit 4.00

Contact Hours/week: 3.0

Section A

Brick: Constituents of brick clay, characteristics, specifications, classification and uses of bricks, efflorescence.

Aggregate: Classification and properties of aggregate, grading of aggregate, testing of aggregate, classification, properties, tests and function of sand.

Cement: Point of difference between cement and lime, composition of ordinary cement, functions of various ingredients of cement, physical properties of Portland cement, types and tests of cement.

Mortar and plaster: Types of mortar, functions of sand and surki in mortar, uses of mortar, preparation of cement mortar, precautions in using mortars, plastering, pointing, white and color washing and distemping.

Section B

Concrete: Function of aggregate and water in concrete, segregation, bleeding, properties of concrete, strength and workability of concrete, factors influence the properties of concrete, creep of concrete, chemical attack of concrete, design of concrete mixes.

Corrosion and its prevention, paints, varnishes, properties and uses of rubber, timber plastics and ferrocement.

Atomic structures and bonding, yielding, fracture, elasticity, plasticity

CE2111 Mechanics of Materials-I

Credit: 3.00

Contact Hours/week: 3.0

Section A

Fundamental concept of stress and strain. Mechanical properties of materials, strain energy, stresses and strains in members subjected to tension, compression, shear and temperature changes. Thin walled pressure containers: riveted and welded Joints.

Section B

Bending moment and shear force diagrams of beams and frames, flexural and shearing stresses in beam, shear flow and shear center.

CE2121 Fluid Mechanics

Credit: 4.00

Contact Hours/week: 4.0

Section A

Development and scope of fluid mechanics, fluid properties, Fluid statics: Manometers and pressure gauges, pressure head, Forces on plane and curved surfaces, center of pressure, application of hydrostatic forces.

Buoyancy and Floatation: Principle of Archimedes's stability of floating body, Metacenter.

Study of incompressible flow in pressure conduits, laminar and turbulent flow.

Kinematics of fluid flow. Fluid flow concept and basic equations, continuity equation, Bernoulli's energy equation, Momentum equation and forces in fluid flow.

Section B

Dimensional Analysis and Model studies: Dimensions and dimensional homogeneity, Importance and use of dimensional analysis. Buckingham's Pi theorem with applications. Geometric, Kinematic and Dynamic similarity. Non Dimensional Numbers.

Pipe flow: general equation for pipe flow, minor losses in pipe flow. Pipe flow problems: pipe in series and parallels, branching of pipes and pipe networks.

Fluid measurements: pitot tube, orifice, mouthpiece, nozzle, venturimeter and Weir.

MATH2125 Differential Equation

Credit: 3.00

Contact Hours/week: 3.0

Section A

Differential equation:

Definition, formation of differential equation and solution of first order ordinary differential equation by various methods. Solution of differential equation of first order and higher degrees. Solution of linear equations of second degree and higher orders with constant co-efficient. Solution of differential equations when the dependent and independent variables are absent. Solution of differential equation in series by the method of Fobenious: Bessel's function, Legendre's polynomials and their properties.

Section B

Fourier series and Partial differential equation:

Fourier series, Periodic functions, odd and even function, evaluation of Fourier co-efficient, Fourier integral, Fourier transforms and their uses to physical problem.

Partial differential equation: Solution of first order partial differential equation by Lagrange method and Charpit method. Definition of harmonics, Laplace equation in Cartesian, polar, cylindrical and spherical co-ordinates.

HUM2127 Sociology and Government

Credit: 2.00

Contact Hours/week: 2.0

Section A: Sociology

scope, some basic concepts. Social evolution and techniques of production, culture and civilization. Social structure of Bangladesh. Population and world resources. Oriental and occidental societies, industrial revolution. Family urbanization and industrialization, urban ecology, co-operative and socialist movements. Rural sociology.

Section B: Government

Some basic concepts of government and politics. Functions, organs and forms of modern state government, socialism, Fascism, Marxism, U.N.O. Government and politics of Bangladesh. Some major administrative systems of developed countries: Local self-government.

CE2104 Engineering Materials Sessional

Credit: 1.50

Contact Hours/week: 3.0

Test of specific gravity, unit weight, moisture content and absorption of coarse and fine aggregate, Normal consistency, setting time, direct tensile and compressive strength of cement mortar, gradation of coarse and fine aggregate, design and testing of concrete mix.

CE2110 Details of Construction

Credit: 1.50

Contact Hours/week: 3.0

Brick masonry, framed structures, arches and lintels, details of floors and roofs, pointing, plastering and interior finishing. Scaffolding and staging, shoring and underpinning, thermal insulation and acoustics, stairs: types and construction details, specifications of materials for the above constructions.

CE2122 Fluid Mechanics Sessional

Credit: 1.50

Contact Hours/week: 3.0

Center of pressure, proof of Bernoulli's theorem, flow through venturimeter, flow through orifice and mouthpiece, concept of velocity by co-ordinate method, flow through mouthpiece, flow over V-notch, fluid friction in pipes, flow over sharp crested weir

Part-II Even Semester

CE2205 Numerical Methods and Computer Programming

Credit: 3.00

Contact Hours/week: 3.0

Section A

Numerical solution of algebraic and transcendental equations, matrices, solution of systems of linear equations, curve-fitting by least squares, finite differences, divided differences, interpolation, numerical differentiation and integration, numerical solution of differential equations.

Section B

Basic components of computer system, C/C++ language, computer applications to Civil Engineering problems.

CE2207 Geology and Geomorphology

Credit: 2.00

Contact Hours/week: 2.0

Section A

Mineralogy: Identification of minerals, common rock forming minerals, physical properties of minerals.

Mineraloids: Rocks: types of rock, cycle of rock change, sedimentation and metamorphism, earthquake and seismic map of Bangladesh.

Structural Geology: Faults, type of faults, dome and basin, fold, fold types, Erosion process, quantitative analysis of erosional land forms, land subsidence, land slide.

Section B

Geomorphology: Channel development, channel widening, valley shape, stream terraces: channel pattern and river basins, channel morphology, drainage pattern, geology and geomorphology of Bangladesh.

CE2211 Mechanics of Materials-II

Prereq. CE2111

Credit: 3.00

Contact Hours/week: 3.0

Section A

Torsional stresses in shafts and tubes, helical springs, combined stresses, Buckling of columns.

Section B

Deflection of beam by direct integration, moment area and conjugate beam methods. transformation of stresses.

MATH2225 Vector analysis, Laplace transformation and Statistics

Credit: 3.00

Contact Hours/week: 3.0

Section A

Vector analysis: Fundamental of vector algebra, scalar and vector product of two vectors. Triple and multiple products, vector differentiation, gradient, divergence and curl. Vector integration, divergence, Gauss's, Green's and Stoke's theorem and their application.

Laplace transformation: Definition, Laplace transforms of some elementary function. Inverse Laplace transforms of derivatives. Solution of differential equation by Laplace transforms.

Section B

Statistics: Measures of central tendency, measures of dispersion, moments, skewness and kurtosis. Elementary probability theory and discontinuous probability distribution e.g. Binomial, Poisson and Normal. Elementary sampling theory, estimation and confidence limit, hypothesis testing, correlation and regression analysis.

HUM2227 Accounting and Engineering Economics

Credit: 3.00

Contact Hours/week: 3.0

Section A

Accounting: Principles of accounting, accounts, transaction, the accounting procedure and financial statements. Cost in general: objectives and classifications. Overhead costing, Cost sheet under job costing operating costing and process costing. Marginal costing: tools and techniques, cost-volume profit analysis. Relevant costing: analyzing the profitability within the firm, guidelines for decision making. Long-run planning and control: capital budgeting.

Section B

Economics: Definition of economics, Economics and Engineering, Principles of Economics.

Micro economics: The theory of demand and supply and their elasticity's. Price determination. Nature of an economic theory, applicability of economic theories to the problems of developing countries. Indifference curve technique. Marginal analysis. Optimization. Market. Production, Production function, types of productivity. Rational region of production of an engineering firm. The short run and the long run. Fixed cost and variable cost. Internal and external economics and diseconomies.

Macro-economics: savings, investment National income analysis. Inflation. Monetary policy, fiscal policy and trade policy with reference to Bangladesh. Planning in Bangladesh.

CE2206 Numerical Methods and Computer Programming Sessional

Credit: 1.50

Contact Hours/week: 3.0

Operating system for microcomputers. Development of different Computer programs and solution of problems using a computer. Solution of Civil Engineering Problems by microcomputers using Math Lab, Etabs, STAAD PRO and ANSYS CIVIL etc.

CE2208 Details of Estimating

Credit: 1.50

Contact Hours/week: 3.0

Detailed estimate of all items of work of a building, details estimate of all items of work of a bridge, truss, culvert and a simple girder bridge.

CE2212 Mechanics of Materials-II Sessional

Credit: 1.50

Contact Hours/week: 3.0

Tension test and impact test of mild steel specimen, hardness test of metals, compression test of timber specimen, helical spring test, static bending test, direct shear test and slender column test.

CE2260 Board Viva-Voce

Credit: 2.00

Contact Hours/week 2:0

Part-III Odd Semester

CE3111Structural Analysis and Design-I

Credit: 3.00

Prereq. CE2111

Contact Hours/week: 3.0

Section A

Stability and determinacy of structures, Influence lines for statically determinate structure: moving loads on beams, frames and trusses.

Section B

Cable supported structures and Trusses & Trusses Analysis. Analysis of statically determinate arches.

CE3113Reinforced Concrete-I

Credit: 3.00

Prereq. CE2211

Contact Hours/week: 3.0

Section A

Fundamental behavior of reinforced concrete members, introduction to WSD and USD methods, analysis and design of singly & doubly reinforced beams. T-beams.

Section B

One way slab according to WSD and USD methods. Diagonal tension, bond and anchorage according to WSD and USD methods, lintels, and staircases.

CE3121Engineering Hydraulics

Credit: 4.00

Prereq. CE2121

Contact Hours/week: 4.0

Section A

Open channel flow and its classification, velocity and pressure distributions, energy equation, specific energy and transition problems, critical flow and control, principles of flow measurement and devices, concept of uniform flow, Chezy and Mannings equations, estimation of resistance coefficients and computation of uniform flow, momentum equation, hydraulic jump, stilling basin, dams and related structures. Theory and analysis of gradually varied flow, computation of flow profiles, design of channel.

Section B

. Impact of water jet, Principles of hydraulic machines: Introduction to Hydraulic Turbines: Working Principles of Pelton, Francis and Kaplan turbines. Pumps: Centrifugal pumps, performance characteristic graph– design flow rate. Working principles of positive displacement pumps, gear, reciprocating and vane pumps. Hydraulic Ram.

CE3131Geotechnical Engineering-I

Credit: 3.00

Contact Hours/week: 3.0

Section A

Introduction to Geotechnical Engineering, formation, type and identification of soils, soil composition, soil structure and fabric, index properties of soils, Engineering classification of soils, soil compaction, principles of total. Effective stresses.

Section B

Permeability and seepage, capillarity and flow net, shear-strength characteristics of soils, compressibility and settlement behavior of soils.

CE3141Environmental Engineering-I**Credit: 3.00****Contact Hours/week: 3.0****Section A**

Introduction to environmental Engineering, community and environment, clean water, sanitation and health, introduction to water supply, population and water requirement.

Water supply sources, ground water and surface water, common water supply systems with specific reference to Bangladesh, different types of hand pumps, installation and O & M of hand pumps, problems of supply, presence of iron and arsenic, hardness, salinity. Alternative technologies for problem areas in Bangladesh: Shallow Shrouded Tube well (SST), Very Shallow shrouded Tube well (VSST), pond sand Filter (PSF), Deep-set technologies.

Water collection and transportation, head works, water distribution system, analysis and design of distribution network, fire hydrants, leak detection, unaccounted for water, alternative technologies, solar stills, rain water harvesting.

Section B

Pumps and pumping machineries

Water quality and treatment, water quality parameters and standards, water treatment: plain sedimentation, flocculation and settlement, filtration, disinfection, other treatment methods, small scale iron and arsenic removal units, other low-cost treatment methods for rural communities, monitoring and sanitary protection of water supply distribution system. Socio-Economic aspects of WSS, Socio-Economy of rural and urban Bangladesh. Demographic characteristics, power structure, cultural issues (traits), rural leadership, local government structure, influence of socio-Economic aspects on community water supply and sanitation. Concept of community participation. participatory planning. community organization, community mobilization, sustainable development approach, gender issues conceptual frame, women empowerment, gender auditing, gender balance and sensitivity.

CE3112Structural Analysis and Design Sessional-I**Credit: 1.50****Contact Hours/week: 3.0**

Design of members and connections of a roof truss and a plate girder bridge.

CE3122Engineering Hydraulics Sessional**Credit: 1.50****Contact Hours/week: 3.0**

Experiments on sluice gate, venture flume, Parshall flume, cut-throat flume, hydraulic jump, velocity distribution profile, Manning's roughness coefficient. Specific force and specific energy: pipe surge and water hammer, preparation and analysis of hydrographs, aquifer characteristics and estimation of yield from wells.

CE3132Geotechnical Engineering Sessional-I**Credit: 0.75****Contact Hours/week: 1.5**

Field identification of soil samples, specific gravity test, Atterberg limits test, grain size analysis by sieve and hydrometer, field density test, standard proctor compaction test, modified proctor compaction test, permeability (constant & variable head) test.

CE3142Environmental Engineering Sessional-I**Credit: 0.75****Contact Hours/week: 1.5**

Physical and chemical tests of water and waste water.

Part-III Even Semester

CE3211Structural Analysis and Design-II

Credit: 3.00

Prereq. CE3111Contact Hours/week: 3.0

Section A

Approximate analysis of statically indeterminate structures. Introduction to moment distribution method.

Section B

Deflection of beams, frames and trusses by virtual work method. Two hinged arches.

CE3213 Reinforced Concrete-II

Credit: 3.00

Prereq. CE3113

Contact Hours/week: 3.0

Section A

Columns, isolated and combined footings. Retaining walls, Introduction of prestressed concrete.

Section B

Reinforced concrete floor and roof systems, flat slabs and flat plates, Two way slabs, review of codes, plastic hinge idea and collapse mechanism, yield line method.

CE3223Hydrology

Credit: 3.00

Contact Hours/week: 3.0

Section A

Surface Water Hydrology:Introduction, Hydrologic cycle, meteorological aspects of hydrology, precipitation, water losses, interception, evaporation, transpiration and infiltration. Run off: Factors affecting run off, estimation of runoff, stream flow, stream flow hydrograph, overland flow,

Section B

Flood routing, statistical methods in hydrology.

Ground Water Hydrology:Introduction, aquifer properties and ground water flow, well hydraulics.Quality of ground water, Ground water recharge. Design, drilling and construction of water wells.

CE3231Geotechnical Engineering-II

Credit: 3.00

Prereq. CE3131

Contact Hours/week: 3.0

Section A

Types of foundations, bearing capacity of shallow and deep foundation,Soil investigation techniques, direct measurement of consistency and relative density, correlation of strength parameters with N-values,

Section B

Lateral earth pressure, stress distribution, settlement computation, settlement and distortion of foundations and slope stability analysis.

CE3251Transportation Engineering-I

Credit: 3.00

Contact Hours/week: 3.0

Section A

Introduction to transportation engineering, development of transportation system, elements of transportation system, transportation in Bangladesh, transportation planning concepts: collection, study and analysis of basic data. Highway location and surveys. Geometric design of highways: elements of design, cross-sectional elements, curves and sight distances, road intersections.

Section B

Highway materials: Desirable properties of road aggregate; production, properties and uses of bituminous materials.

Traffic Engineering: the road/traffic system, vehicle and traffic characteristics, traffic control devices, traffic studies, parking and roadway lighting.

Road safety engineering: Accident data system, Road engineering, Traffic legislation, Traffic enforcement, Driver training & testing, Vehicle safety, Education & publicity, Medical services.

CE3214 Structural Analysis and Design Sessional-II

Credit: 1.50

Contact Hours/week: 3.0

Design of a Slab bridge and a Deck-girder bridge.

CE3222 Engineering Hydraulics Sessional

Credit: 1.50

Contact Hours/week: 3.0

Experiments on sluice gate, venture flume, Parshall flume, cut-throat flume, hydraulic jump, velocity distribution profile, Manning's roughness coefficient. Specific force and specific energy: pipe surge and water hammer, preparation and analysis of hydrographs, aquifer characteristics and estimation of yield from wells.

CE3232 Geotechnical Engineering Sessional-II

Credit: 0.75

Contact Hours/week: 1.5

Direct shear test, unconfined compression test, triaxial compression test, relative density test, consolidation test, Field test (SPT).

CE3252 Transportation Engineering Sessional-I

Credit: 0.75

Contact Hours/week: 1.5

Roadway capacity studies, Tests on road aggregate, Tests on bituminous material.

CE3260 Board Viva-Voce

Credit: 2.00

Contact Hours/week 2.0

CE3200 Industrial Training

Credit: 0.00

Contact Hours: 2 Weeks

Part-IV Odd Semester

CE4111Structural Analysis and Design-III

Credit: 4.00

Prereq. CE3211

Contact Hours/week: 4.0

Section A

Analysis of statically indeterminate structures by displacement method, deflection and moment distribution method. Influence lines for statically indeterminate beams, frames, arches and grids.

Section B

Stiffness matrix, member stiffness, stiffness, stiffness transformation, assembly of stiffness matrices & solution for beams, frames and plane trusses and flexibility matrix.

Analysis of composite structures.

CE4121Irrigation and Flood Management

Credit: 3.00

Prereq. CE3121

Contact Hours/week: 3.0

Section A

Irrigation:Importance of irrigation: Source and quality of irrigation water, soil-water relationship, consumptive use, estimation of irrigation water requirements and irrigation scheduling. Methods of irrigation. Design of irrigation canal system, irrigation structures and irrigation devices.

Section B

Water logging, salinity and reclamation. Problems of irrigated land. Irrigation projects and institutional constraints.

Flood Management:Flood and its causes, Methods of flood management, structural and non-structural measures such as reservoirs, levees and flood walls, channel improvement, interior drainage, floodways, land management, flood proofing, flood zoning, flood hazard mapping, flood forecasting and warning. Economic aspects of flood management, flood risk and vulnerability analysis, direct and indirect losses of flood. flood damage assessment, flood damage in urban and rural areas, Floods in Bangladesh.

CE4131Geotechnical Engineering-III

Credit: 3.00

Prereq. CE3231

Contact Hours/week: 3.0

Section A

Foundation Engineering: Report and selection of type of foundation, design and construction of mat and pile foundations.

Section B

Caissons and cofferdam. Sheet piling wall. Introduction to soil improvement techniques.

CE4141Environmental Engineering-II

Credit: 3.00

Prereq. CE3141

Contact Hours/week: 3.0

Section A

Environmental sanitation, introduction to environmental sanitation, environmental pollution, environmental protection and management. sanitation practices in Bangladesh, different sanitation options-various types of pit latrines, pour flush latrines etc., upgrading of existing systems, construction and maintenance of sanitation facilities, sanitation for densely populated area, community latrine cum bio-gas plant, design and construction of septic tank and soak well, building sanitation, code of practice.

Health and hygiene: Disease description, transmission and control, hygiene education, scope and methodology, social mobilization for hygiene practice, integrated approach for water, sanitation and health education.

Section B

Wastewater, estimation of wastewater, wastewater collection system, hydraulics of sewer, design, construction and maintenance of sanitary sewer and storm drainage system.

Microbiology of wastewater, preparatory, primary and secondary treatment waste stabilization ponds and other methods and disposal of waste water, aquaculture as treatment option, small bore sewer system, treatment and disposal of industrial effluents.

CE4151Transportation Engineering-II

Credit: 3.00

Prereq. CE3251

Contact Hours/week: 3.0

Section A

Highway: Sub-grade, sub-base and base courses, soil stabilization and soil aggregates in road constructions, low-cost roads, mix design methods. Design, construction and maintenance of flexible and rigid road pavements, equipment.

Section B

Railways: General requirements, alignment, permanent way, station and yards. signaling, points and crossings, maintenance.

Waterways: Introduction, harbors, ports, docks, coastal structures.

CE4112Structural Analysis and Design Sessional -III

Credit: 1.5

Contact Hours/week: 3.0

Principles of different types of bridges over rivers and wide canals, detailed design of a balanced cantilever bridge.

CE4142Environmental Engineering Sessional -II

Credit: 0.75

Contact Hours/week: 1.5

Bacteriological tests of water, design of water supply system.

CE 4152Transportation Engineering Sessional -II

Credit: 0.75

Contact Hours/week: 1.5

Tests on sub-grade, sub-base and base materials, Mix design Method for bituminous concrete.

***CE 4100 Project and Thesis**

Credit: 1.50 Contact Hours/week: 3.0

Experimental and theoretical investigation of various topics in structural Engineering concrete technology, Environmental Engineering, Transportation Engineering, Geotechnical Engineering and water resources engineering. Individual or group study of one or more topics from any of the above fields. The students will be required to submit thesis/project report at the end of the work.

*** This credit will be assigned at the end of Part-4 Even Semester**

Part- IV Even Semester

(Compulsory-1)

CE4201 Project Planning and Construction Management

Credit: 3.00

Contact Hours/week: 3.0

Section A

Principles of Management, principles of construction management, construction contracts and specifications, inspection and quality control, construction safety, construction planning and scheduling.

Section B

PERT, CPM, case studies, resource scheduling, PERT: a cost accounting system, linear programming, decision making and simulation, psychology in administration, materials management, demand forecasting, inventory control, personnel management, stores management, procurement, project planning and evaluation, feasibility reports, cash flow, payback period, internal rate of return, benefit-cost ratio, construction equipment and plants, replacement studies.

CE4210 Structural Analysis and Design Sessional -IV

Credit: 1.50

Contact Hours/week: 3.0

Introduction to tall buildings in different countries of the world. Design of high rise compression members by WSD and USD methods. Design of beams, columns and beam-column joint.

(Option-1)

CE4211 Prestressed Concrete

Credit: 2.00

Contact Hours/week: 2.0

Section A

Prestressed concrete: materials, prestressing systems, loss of prestress, analysis of sections for flexure, shear, bond and bearing, beam deflections and cable layout,

Section B

Partial prestress, design of prestressed sections for flexure, shear, bond and bearing. Analysis and design of prestressed beam section.

CE4213 Theory of Elasticity and Elastic instability of Structures

Credit: 2.00

Contact Hours/week: 2.0

Section A

Introduction to theory of elasticity, plane stress and plane strain condition, two dimensional problems in rectangular and polar coordinates,

Section B

torsion of circular and non-circular shafts, instability of structures, stability functions.

CE4215 Finite Element Method

Credit: 2.00

Contact Hours/week: 2.0

Section A

Introduction to finite element method as applied to Civil Engineering problems. One dimensional stress deformation and time dependent flow problem.

Section B

Analysis of two dimensional plane stress and plane strain problems.

CE4217 Design of Steel Structures

Credit: 2.00

Contact Hours/week: 2.0

Section A

Behavior of structural steel members and steel frames, code requirements, design of tension and compression members by WSD and USD methods,

Section B

Design of beam. Beam-columns joint design.

CE4212 Structural Analysis and Design Sessional -V

Credit: 1.50

Contact Hours/week: 3.0

Design of various reinforced concrete structures e.g. water tanks, folded plate roof etc.

(Option-2)

CE 4221 River Engineering

Credit: 2.00

Contact Hours/week: 2.0

Section A

Behavior of alluvial rivers. River channel pattern and fluvial processes. Aggradation and degradation, local scours. River training and bank protection works.

Section B

Navigation and dredging. Sediment movement in river channels, bed forms and flow regimes.

CE 4223 Ground Water Engineering

Credit: 2.00

Contact Hours/week: 2.0

Section A

Ground water in hydrologic cycle and its occurrence. Physical properties and principles of ground water movement. Ground water and well hydraulics. Ground water resource evaluation. Ground water levels and environmental influences.

Section B

Ground Water pollution and contaminant transport. Recharge of ground water. Saline water intrusion in aquifer. Ground water management.

CE4225 Hydraulic Structures

Credit: 2.00

Contact Hours/week: 2.0

Section A

Principles of design of hydraulic structures, types of hydraulic structures. Design of dams, barrages, weirs, spillways,

Section B

Energy dissipaters and spillway gates. Cross drainage works.

CE4227 Coastal Engineering

Credit: 2.00

Contact Hours/week: 2.0

Section A

Coast and coastal features. Tides and currents. Tidal flow measurement. Waves and storm surges. Docks and labor.

Section B

Forces of waves and tides in the design of coastal and harbor structures. Coastal sedimentation processes. Deltas and estuaries. Shore protection works. Dredging and dredgers.

CE4220 Water Resources Engineering Sessional

Credit: 1.50

Contact Hours/week: 3.0

Design of hydraulic structures, river training works. Groundwater resource assessment and water well design.

(Option-3)

CE4231 Geotechnical Engineering-IV

Credit: 2.00

Contact Hours/week: 2.0

Section A

Foundation for structures subjected to lateral loads, retaining walls and abutments, operation and methods of construction, de-watering and slurry-wall construction.

Section B

Flexible earth retaining structures, sheet piles, cofferdams, caissons, machine foundations, elementary vibrations, shear modulus and elastic constants, foundation design for vibration, fundamentals of soil liquefaction.

CE4233 Geotechnical Engineering-V**Credit: 2.00****Contact Hours/week: 2.0****Section A**

Introduction to critical state soil mechanics, SHANSEP and stress path methods, stress deformation and failure of soil masses. One, two and three dimensional consolidation problem,

Section B

Pore pressure coefficients, soil structure-interaction, earthquake and liquefaction problems, soil improvement, numerical solution of Geotechnical Engineering problems.

CE4235 Geotechnical Engineering-VI**Credit: 2.00****Contact Hours/week: 2.0****Section A**

Introduction to soil-water interaction problems. Permeability, capillarity and soil suction. Seepage analysis, stability of natural, man-made slope, and excavation subjected to seepage,

Section B

Water current, wave action etc. Theories of filters and revetment design, hydraulic fills.

CE4232 Geotechnical Engineering Sessional-III**Credit: 1.50****Contact Hours/week 3.0**

Interpretation of soil test results and design of foundation.

(Option-4)

CE4241 Solid Waste Management**Credit: 2.00****Contact Hours/week: 2.0****Section A**

Sources and types of solid wastes, physical and chemical properties of solid wastes, solid wastes generation, on-site handling, storage and processing, collection of solid wastes, community and municipal collection systems,

Section B

Transfer station and transport, Ultimate disposal methods, recycling and resources recovery, soil pollution, industrial solid waste collection and disposal, hazardous waste management.

CE4243 Environmental Development Project**Credit: 2.00****Contact Hours/week: 2.0****Section A**

Environment and sustainable development, environmental policies and legislation, environmental implication of sectoral development, environmental quality standards, environmental issues and priorities,

Section B

Environmental impact assessment of development schemes, baseline studies, assessment methodologies, economics of environmental management, special topics.

CE4245 Environmental Pollution Control**Credit: 2.00****Contact Hours/week: 2.0****Section A**

Environment Pollution and its control: Water pollution-source and types of pollutants, waste assimilation capacity of streams, dissolved oxygen modeling, ecological balance of streams, industrial pollution, heavy

metal contamination, detergent pollution and eutrophication, ground water pollution, marine pollution control measures-water quality monitoring and management.

Section B

Air pollution: Sources and type of pollutants, effects of various pollutants on human health, material and plants, air pollution meteorology, global warming and greenhouse effects, air pollution monitoring and control measures, noise pollution and its effects, ozone layer depletion and acid rain.

CE4240 Environmental Engineering Sessional-III

Credit: 1.50

Contact Hours/week: 3.0

Design of sewerage systems, field visits/ assignments on existing water supply and sanitation technologies, case study on user's participation, O & M practices and ownership, community managed projects.

(Option-5)

CE4251 Transportation Engineering-III

Credit: 2.00

Contact Hours/week: 2.0

Section A

The transportation planning process, traffic management concepts, traffic accident investigations, city road and street networks, grade separation and interchanges pedestrian and bicycle facilities.

Section B

The urban bypass, environmental aspects of highway traffic and transportation projects, elements of traffic flow.

CE4253 Transportation Engineering-IV

Credit: 2.00

Contact Hours/week: 2.0

Section A

Highways drainage and drainage structures. Evaluation and strengthening of pavements, importance, advantages and trends in air transportation, planning and design of airports, aircraft characteristics related to airport design,

Section B

Types and elements of airport planning studies, airport configuration, geometric design of the landing area, terminal area, heliports, design of airport pavements, lighting, marking and 'signing, airport drainage.

CE4255 Transportation Engineering-V

Credit: 2.00

Contact Hours/week: 2.0

Section A

Highway needs study, highway planning, economics and financing, evaluation and analysis of transportation projects, management, monitoring, organization and implementation of transportation projects,

Section B

Selected case studies, traffic engineering administration and legislation, urban public transportation and freight movement.

CE4250 Transportation Engineering Sessional-III

Credit: 1.50

Contact Hours/week: 3.0

Section A

Design of flexible and rigid highway and air field pavements.

Section B

geometric design: Roadway intersections, capacity calculation, traffic studies and design.

(Compulsory-2)

CE4200 Project and Thesis

Credit: 3.00

Contact Hours/week: 6.0

CE4260 Board Viva-Voce

Credit: 2.00

Contact Hours/week: ---

CE4270 Seminar

Credit: 2.00

Contact Hours/week: ---