RSET

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

CURRICULUM BOOK
(As per MGU)

Department of Civil Engineering

Rajagiri School of Engineering & Technology
Department of Civil Engineering
(DCE)

Our Vision

To evolve into a premier technological and research institution, moulding eminent professionals with creative minds, innovative ideas and sound practical skill, and to shape a future where technology works for the enrichment of mankind.

Our Mission

To impart state-of-the-art knowledge to individuals in various technological disciplines and to inculcate in them a high degree of social consciousness and human values, thereby enabling them to face the challenges of life with courage and conviction.

Department Vision

The department strives to excel in the areas of academia, research and industry by moulding professionals in the field of Civil Engineering to build a sustainable world.

Department Mission

To impart quality education and mould technically sound, ethically responsible professionals in the field of Civil Engineering with a broad skill set of creativity, critical thinking and effective communication skills to meet the desired needs of the society within realistic socio-economic environmental constraints.

Program Outcomes (POs)

Engineering Graduates will be able to:

PO 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and nee for sustainable development.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

PO 11. 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 and leader in a team, to manage projects and in multidisciplinary environments.

PO 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mahatma Gandhi University

Course Regulations

of

B.Tech. Degree Courses (Revised)

(With effect from 2010 admissions)

1. Conditions for Admissions

Candidates for admission to the B.Tech. Engineering degree course shall be required to have passed the Higher Secondary Examination of State Board of Kerala or 12th Standard V.H.S.E., C.B.S.E., I.C.S.E. or examinations recognized equivalent by any Universities of Kerala thereto with mathematics, physics and chemistry as optional subjects, with 50% marks in Mathematics and 50% marks in Physics, Chemistry, and Mathematics put together. Candidates belonging to scheduled caste and scheduled tribe need only a pass in the qualifying examination.

Candidates have to qualify the State Level Entrance examination conducted by the Commissioner of Entrance Examinations or State level/National level Entrance Examination approved by the Government of Kerala as equivalent. They shall also satisfy the conditions regarding age and physical fitness as prescribed by the Mahatma Gandhi University

Criteria for selection and method of admission to merit/management seats for Engineering degree courses conducted by Government/Aided/Self-financing colleges affiliated to Mahatma Gandhi University shall be governed by the rules/regulations framed by the Commissioner of Entrance Examinations or other competent authority appointed by the Government of Kerala, in consultation with the University and without contravening with the stipulation of the All India Council for Technical Education (AICTE). In all matters related to selection and admission, the decisions of the University shall be final. The students admitted by affiliated colleges violating the above regulations will not be eligible for registration to University Examinations and contravention of the regulations shall lead to withdrawal/suspension of affiliation.

2. Admission to Diploma Holders

A candidate who has a diploma in engineering awarded by the State Board of Technical Examination or an examination recognized equivalent by the State Board of Technical Education after undergoing regular course of 3 years in an institute approved by AICTE, securing a cumulative minimum of 50% marks in the second and third years diploma examination shall be eligible to be admitted to the first year B.Tech. programme of the Mahatma Gandhi University (hereafter, the University, unless otherwise specified) if he/she has qualified the entrance examination conducted by the Commissioner of Entrance Examinations or State level/National level Entrance Examination approved by the Government of Kerala as equivalent.

Diploma holders with 60% marks (50% in case of SC/ST) are also eligible for admission to the 3rd semester (regular full-time batch) engineering degree course (B.Tech.) under the lateral entry scheme provided they qualify the Entrance Examination conducted for the lateral entry scheme by the state Government. These students are not required to study any deficiency papers of the combined first and second semesters. Admission of all candidates under the lateral entry scheme shall be completed latest by commencement of 3rd semester classes.

3. Subjects of Study

The subjects of study, both theory and practical, shall be in accordance with the prescribed scheme and syllabi of each branch of study.

4. Duration of the Course

The course for the B.Tech degree shall extend over a period of four academic years comprising of eight semesters. The first and second semesters shall be combined; the scheme and syllabi for combined first and second semesters ($S_{1\&}S_2$) will be common for all branches of study. The maximum duration permissible for taking the B.Tech. Degree is fixed as 8 years. For lateral entry students maximum duration permissible for taking the B.Tech. Degree is fixed as 7 years.

Classes of combined first and second semesters shall be started latest by 1st August in all affiliated engineering colleges of Mahatma Gandhi University; however admission to first year shall be completed by 31st August.

The minimum number of working days in combined first and second semesters shall be 150 days. In 3rd to 8th semesters, there shall be minimum 90 working days.

5. Branches of Study

1. Civil Engineering (CE)
2. Mechanical Engineering (ME)
3. Electrical and Electronics Engineering (EE)
4. Electronics and Communication Engineering (EC)
5. Electronics & Instrumentation Engineering (EI)
6. Instrumentation and Control Engineering (IC)
7. Applied Electronics and Instrumentation Engineering (AI)
8. Computer Science and Engineering (CS)
9. Information Technology (IT)
10. Polymer Engineering (PO)
11. Automobile Engineering (AU)
12. Aeronautical Engineering (AN)
13. Production Engineering (PE)

6. Course Calendar

The course calendar, published by the University, shall be followed by all affiliated engineering colleges. Within a week after the commencement of classes of each semester, Head of each Institution should forward the list of faculty members working in the college along with their qualification and years of teaching experience, to the University. This is a mandatory requirement which should be strictly followed by Head of each Institution. Head of each Institution shall ensure the availability of sufficient number of regular faculty members having experience and qualifications (as per AICTE guidelines) in the institution.

7. Assessment of Students

Assessment of students for each subject will be done by internal continuous assessment and Semester-End examinations. Internal assessment shall be conducted throughout the semester. It shall be based on internal examinations, assignments (such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.) as decided by the faculty handling the course, and regularity in the class. Assignments of every semester shall preferably be submitted in Assignment Book, which is a bound book similar to laboratory record.

Semester-End examinations of theory and practical subjects will be conducted by the University. Semester-End examinations of combined first and second semesters and 3^{rd} to 6^{th} semesters will be conducted only once in a year; failed or improvement candidates will have to appear for the Semester-End examinations along with regular students. However, Semester-End examinations of 7^{th} and 8^{th} semesters will be conducted once in every semester. Head of institution should take necessary steps to prevent any malpractices in the Semester-End examinations. If any such instances are detected, they should be reported to the University without any delay.

Internal assessment marks of each theory subject should have a class average limited to 80%. If the class average of internal assessment marks of any theory subjects is greater than 80%, existing normalization procedure should be applied to limit it to 80%. If the class average is not greater than 80%, absolute marks should be given.

For practical subjects, internal assessment marks and Semester-End examination marks individually should have a class average limited to 80%. If the class average of internal assessment marks or Semester-End examination marks of practical subjects is greater than 80%, the existing normalization procedure should be applied to limit the class average to 80%. If it is not greater than 80%, absolute marks should be given.

All the students in the nominal roll of the class on the closing day of semester should be considered for normalization of internal marks. All the students who have passed the Semester-End practical examination should be considered for normalisation of marks of Semester-End practical examinations.

Internal assessment marks of theory and practical subjects, both absolute and normalised, should be published in the college 10 days before sending it to the University so as to enable the students to report any corrections.

(a) Assessment in Theory Subjects

The marks allotted for internal continuous assessment and Semester-End university examinations shall be 50 marks and 100 marks respectively with a maximum of 150 marks for each theory subject.

The weightage to award internal continuous assessment marks should be as follows:

Test papers (minimum two)	– 60%
Assignments (minimum two) such as home assignments, problem solving, group discussions, quiz,	

literature survey, seminar, term-project, software exercises, etc.	– 20%
Regularity in the class	– 20%

The sessional marks awarded for attendance shall be awarded in direct proportion to the percentage of attendance secured by the candidate in the subject. Full credit for regularity in the class can be given only if the candidate has secured minimum 90% attendance in the subject.

(b) Assessment in Practical Subjects

Internal continuous assessment and Semester-End practical examinations will have weightage in the student's performance of practical subjects, with 50 marks allotted for internal continuous assessment and 100 marks for Semester-End examinations.

The weightage to award internal continuous assessment marks should be as follows:

Test papers	– 30%
Regular work/drawing/workshop record/lab record/ Class performance	– 50%
Regularity in the class	– 20%

An external examiner and an internal examiner, appointed by the University, shall conduct the Semester-End examinations of practical subjects. These examiners should necessarily have minimum two years teaching experience at engineering degree level.

Award of marks in the Semester-End practical examinations (except Project) should be as follows:

Viva voce	– 30%
Procedure and tabulation form, Conducting experiment, results and inference	– 70%

No candidate will be permitted to attend the Semester-End practical examinations unless he/she produces certified record of the laboratory.

Strict measures will be taken by the University to monitor the laboratory facilities, laboratory experiments conducted, standard of Semester-End practical examinations, etc. in every affiliated engineering college. In this regard, an expert team comprising of at least three subject experts from government/government-aided engineering colleges from within/outside the University shall be formulated to assess these aspects in affiliated engineering colleges. This expert team should visit each engineering college at least once in a semester and submit a detailed report to the University regarding the laboratory facilities, laboratory experiments conducted, and standard of Semester-End practical examinations in each college.

8. Pattern of Questions for Semester-End Examinations of Theory Subjects

The question papers of Semester-End examinations of theory subjects shall be able to perform achievement testing of the students in an effective manner. The question paper shall be prepared

(a) covering all sections of the course syllabus
(b) unambiguous and free from any defects/errors
(c) emphasizing knowledge testing, problem solving & quantitative methods
(d) containing adequate data/other information on the problems assigned
(e) having clear and complete instructions to the candidates.

Duration of Semester-End examinations will be 3 hours. The pattern of questions for theory subjects shall be as follows:

PART A: Short answer questions (one/two sentences) 5 x 3 marks=15 marks
All questions are compulsory. There should be at least one question from each module.

PART B: Analytical/Problem solving questions 5 x 5 marks=25 marks
All questions are compulsory. There should be at least one question from each module.

PART C: Descriptive/Analytical/Problem solving questions 5 x 12 marks=60 marks
Two questions from each module with choice to answer one question.

Maximum Total Marks: 100

Weightage for categories such as problem solving, descriptive, drawing, or diagrammatic questions shall be specified along with the syllabus of any subject, if necessary. Model question paper shall be prepared for each subject at the time of framing the syllabus. This same model question paper along with the syllabus must be sent to the question-paper setter every time for framing the questions. The model question paper shall be made available to students.

It is permitted to have an entirely different pattern of questions especially for subjects involving drawing, design, etc. However, the modified pattern to be followed shall be clearly specified along with the syllabus of the particular subject. All question paper setters should supplement the scheme and key for the evaluation

9. Minimum for Pass

A candidate shall be declared to have passed in an individual subject of a semester examination if he/she secures not less than 40% marks for the subject in the university

examination and not less than 50% of the total marks of the subject *i.e. university examination marks and sessional marks in that subject put togather.*

A candidate shall be declared to have passed in a semester examination in full in first appearance (first registration is considered as first appearance) if he satisfies the above criteria for each theory and practical subject.

Candidates will be assigned grades according to the marks scored.

For Seminar, Project, and Viva Voce (in 8th semester), the minimum for a pass shall be 50% of the total marks assigned to the respective examination.

If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this 'Save a Semester examination' within one week after the publication of eighth semester results.

10. Credit System

Each subject shall have a certain number of credits assigned to it depending upon the academic load and the nature and importance of the subject. The credit associated with each subject will be shown in the prescribed scheme and syllabi. Each course shall have an integer number of credits, which reflects its weightage.

11. Grading

The university shall award the letter grade to students based on the marks secured by them in both internal assessment and Semester-End examinations taken together in the subjects registered. Each letter grade indicates a qualitative assessment of the student's performance and is associated with a specified number of grade points. The grading system along with the grade points for each grade, applicable to passed candidates is shown below. All passed candidate will be allotted a grade S, A, B, C, D, or E according to the total marks scored by him/her.

If a candidate does not pass a subject as per the conditions given in Section (9), he/she will be assigned an Unsatisfactory grade 'U' irrespective of his/her total marks. If a student does not pass a subject in two attempts, the maximum grade he/she can get is 'C' when he/she passes the subject in any subsequent examination, whatever be the marks scored by him/her.

A student is considered to have completed a subject successfully and earned the credits if he/she secures a letter grade other than 'U' in that course. Letter grade 'U' has zero grade point and the candidate has to write the examination again to improve the grade. A student's performance is measured by the number of credits that he/she has earned and by the cumulative grade point average (CGPA) maintained by him/her.

Total marks scored by the passed candidate	Corresponding Grade allotted	Grade Points
136-150	S	10
121-135	A	9.0
106-120	B	8.0
91-105	C	7.0
83-90	D	6.0
75-82	E	5.5
Failed	U	0.0

12. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

(a) A Semester Grade Point Average (SGPA*)* shall be computed for all the students for each semester, as follows:

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

where, n is the number of subjects registered during the semester, C_i is the number of credits allotted to i^{th} subject as per the scheme, and G_i is the grade points corresponding to the grade awarded to the student for the subject.

(b) A Cumulative Grade Point Average (CGPA) shall be computed for all the students at the end of each semester by taking into consideration their performance in the present and the past semesters as follows:

$$CGPA = \frac{\sum_{i=1}^{m} C_i G_i}{\sum_{i=1}^{m} C_i}$$

where, m is the number of courses registered up to that semester, C_i is the number of credits allotted to i^{th} subject as per the scheme, and G_i is the grade points corresponding to the grade awarded to the student for the subject.

An up-to-date assessment of overall performance of a student is obtained by calculating CGPA. CGPA is weighted average of the grade points obtained in all the subjects registered by the students since he entered the B.Tech. course.

(c) Both the SGPA and CGPA shall be rounded off to the second place of decimal and recorded as such for ease of presentation. Whenever the CGPAs are to be used for the purpose of determining the merit ranking in a group of students, only the rounded off values shall be made use of.

13. Improvement

Candidates shall be allowed to improve the grade of any two theory subjects in a semester. This can be done only in the immediate subsequent chance. If the candidate gets more marks in the improvement chance, marks scored in the improvement chance will be considered for grading in the subject; otherwise marks scored in the first attempt will be retained. No candidate shall be permitted to improve the marks scored in practical examinations and internal continuous assessment.

14. Attendance

A candidate shall be permitted to appear for the Semester-End examinations only if he/she satisfies the following requirements:

(a) He/she must secure not less than 75% attendance in the total number of working periods during the first year and in each semester thereafter; and shall be physically present for a minimum of 60% of the total working periods. In addition, he/she also shall be physically present in at least 20% of total attendance for each subject.
(b) He/she must earn a progress certificate from the head of the institution stating that he/she has satisfactorily completed the course of study prescribed in the semester as required by these regulations.
(c) His/her conduct must be satisfactory

It shall be open to the Vice Chancellor to grant condonation of shortage of attendance on the recommendation of the head of the institution in accordance with the following norms.

- The shortage shall not be more than 10%
- Condonation will be permitted on medical grounds only.
- Shortage shall not be condoned more than twice during the entire course.
- Candidate who is not eligible for condonation of shortage of attendance shall repeat the semester.

15. Eligibility for Promotion to Higher Semester – Procedure for completing the course

(a) A student who has secured 75% of attendance and has exhibited satisfactory progress in the class will be eligible for promotion to the next higher semester.

(b) However, before being admitted to the VIII semester classes, the student should have passed in all subjects in the combined first and second semester examination in full.

Note: As this is an academic prerequisite, no exemption should be granted in this case, whatever be the causes.

A candidate shall complete the programme and pass all examinations within Eight (8) years since his first admission to the B.Tech programme.

16. Registration for end Semester examination

Every candidate should register for all subjects of the Semester-End examinations of each semester. A candidate who does not register will not be permitted to attend the Semester-End examinations; he/she shall not be permitted to attend the next semester.

A candidate shall be eligible to register for any higher semester (i.e. 3rd semester onwards) if he/she has satisfactorily completed the course of study and registered for the examination of the immediate previous semester. He/she should register for the semester at the start of the semester before the stipulated date. University will notify the starting and closing dates for each semester.

17. Additional Requirements for the degree

In addition to the requirement prescribed for the award of B.Tech. degree, each student must complete compulsory social service for a total duration of 15 days during 3rd to 7th semesters of the course. A record is to be kept showing the details of social service activities undertaken and it should be approved by the Staff Advisor. Head of Institution should verify this compulsory requirement before permitting the student to register for the eighth semester.

Students are expected to undertake industrial training(s) of total 10 days minimum duration or industrial visits (to minimum 2 industries) for studying about the industries of importance to the branch concerned during 4th to 7th semester. Students may also undertake an educational tour, the tour period shall be considered as part of the working periods of a semester. The tour maybe conducted during the vacation/holidays taking not more than 3 working days, combined with the vacation/holidays if required, between 5th and 8th semesters for visiting industries (at least two) of importance to the branch concerned. Faculty members shall accompany the students for the industrial visits/educational tour. Each student shall submit detailed bound report(s) of the training/visit/tour to the Head of Department within two weeks after the programme. These bound report(s), signed by the staff advisor or faculty in charge of tour/training/visit and by the head of department, shall also be brought during the final Viva-Voce.

18. Examination Monitoring Cell

Head of the each institution should formulate an Examination Monitoring Cell at the institution for supervising all examinations, especially the internal examinations. This cell, with a senior staff member as Convener, shall consist of minimum three members (one shall be a lady).

The collective responsibilities of the examination monitoring cell are

(a) officiate as the examination squad to keep a vigil on all Semester-End examinations. If any malpractices are found/reported by invigilators, inform these to the Head of Institution along with a report about the incident. Head of Institution shall forward all such complaints to the University.
(b) schedule all examinations conducted as part of internal assessment of students.
(c) to receive any complaint from students regarding issues like out-of-syllabus questions, printing mistakes, etc. of Semester-End examinations of theory and practical subjects. The cell shall investigate these complaints and if necessary forward it to university with specific comments.
(d) to receive any complaints from students regarding internal examinations, enquire such incidents, and give a report to the Head of Institution for necessary action.

To conduct all the theory examinations, a Chief Superintendent and Senior Assistant Superintendent should be appointed internally by the Head of Institution. At least one external Additional Chief Superintendent from government/government-aided engineering colleges within the University should be appointed by the University for conducting theory examinations in all affiliated self financing Engineering Colleges.

19. Electives

All students shall choose four elective subjects, one in the sixth, one in the seventh and two in eighth semesters from a set of elective subjects prescribed in the syllabus and offered by the institution. There should be at least 25% students of the class for an elective subject to be offered. However, any student having a CGPA of not less than 7.5 shall be permitted to select an elective of his/her choice and register under a faculty subject to the permission from the faculty and Head of Department. The student will have to study this subject on his own (self-study mode) or the classes of this subject shall be taken during off-hours.

A student can opt for interdisciplinary electives, termed as global electives in the syllabus, maximum one during 8^{th} semesters subject to the permission from both Heads of Departments and the faculty handling the elective subject. Minimum number of students for a global elective shall be 15 and maximum 60.

New electives may be introduced according to the needs of emerging fields in technology. The name of the elective and its syllabus should be approved by the university before the subject is offered as an elective.

20. Class Committee

Head of institution shall take necessary steps to form a class committee for each class at the start of classes of each semester. This class committee shall be in existence for the

semester concerned. The class committee shall consist of the Head of Department, Staff Advisor of the class, a senior faculty member of the department, a faculty member from another department, and two student representatives (one of them should be a girl in a mixed class). There should be at least two meetings of the class committee every semester; it shall be the responsibility of the Head of Department to convene these meetings. The decisions of the Class Committee shall be recorded in a register for further reference. Each class committee will communicate its recommendations to the Head of Institution.

The responsibilities of the class committee are:

(a) to review periodically the progress and conduct of students in the class.
(b) to discuss any problems concerning any subjects in the semester concerned.
(c) to identify weaker students of the class and suggest remedial measures.
(d) to review teaching effectiveness and coverage of syllabus.
(e) discuss any other issue related to the students of the class.

21. Eligibility for the Degree

No candidate shall be eligible for the B.Tech. degree unless he has undergone the prescribed course of study for a period of not less than four academic years in an institution affiliated to the Mahatma Gandhi University and has passed all subjects as per the prescribed syllabus.

No candidate under lateral entry scheme shall be eligible for the B.Tech. degree unless he has undergone the prescribed course of study for a period of not less than three academic years in an institution affiliated to the Mahatma Gandhi University and has passed all subjects of 3rd to 8th semesters as per the prescribed syllabus.

22. Classification of Successful Candidates

(a) A candidate who qualifies for the degree, passing all the subjects of the eight semesters within 5 academic years after the commencement of his course of study and secures not less than a CGPA of 8.0 of all the semesters shall be declared to have passed the B.Tech. degree examination in First Class with Honours.

(b) A candidate who qualifies for the degree, passing all the subjects of the eight semesters within 5 academic years after the commencement of his course of study and secures not less than a CGPA of 6.5 of all the semesters shall be declared to have passed the B.Tech. degree examination in First Class.

(c) All other candidates who qualify for the degree passing all the subjects of the eight semesters and not covered as per Sections 22 (a) and (b) shall be declared to have passed the B.Tech. degree examination in second class.

(d) Classification of the lateral entry student can be given based on the CGPA of 3rd to 8th semesters. The final mark-list of lateral entry students should indicate that (i) the student was admitted through lateral entry scheme (ii) classification is based on CGPA of 3rd to 8th semesters. He/she should have passed all the subjects of the 3rd to 8th semesters within 4 academic years after the commencement of the course of study.

It may be indicated in each mark-list that the internal assessment marks and Semester-End examination marks of practical subjects are normalised.

23. Grievance Cell

Each college should setup a Grievance Cell with at least four faculty members to look into grievances of the students, if any.

24. Anti-Ragging Cell

Head of Institution shall take necessary steps to constitute anti-ragging committee and squad at the commencement of each academic year. The committee and the squad shall take effective steps as specified by the Honorable Supreme Court of India, to prevent ragging.

Notwithstanding all that has been stated above, the University has right to modify any of the above regulations from time to time as per University rules.

Annexure

Equivalency of Diploma Streams for Part-Time B.Tech. Admission

Sl. No.	Specialisation in Diploma	Branch Equate for B.Tech. Admission
1	Applied Electronics	Electronics and Communication Engineering
2	Electronics	
3	Medical Electronics	
4	Electronics and Avionics	
5	Telecommunication Technology	
6	Electronics and Instrumentation	
7	Electronics and Medical Instrumentation	
8	Electronics Production Technology	
9	Medical Instrumentation	
10	Power Electronics	
11	Biomedical Engineering	

12	Civil	Civil Engineering
13	Architecture	
14	Quantity Survey and Construction Management	
15	Mechanical	Mechanical Engineering
16	Automobile	
17	Tool and Die	
18	Wood and Paper Technology	
19	Computer Engineering	Computer Science and Engineering
20	Computer Application and Business Management	
21	Computer Hardware Maintenance	
22	Information Technology	
23	Electrical	Electrical and Electronics Engineering
24	Instrument Technology	
25	Chemical Engineering	Chemical Engineering

Mahatma Gandhi University Revised Scheme For B Tech Syllabus Revision 2010 (Civil Engineering)

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
CE010 303	Fluid Mechanics	2	2	-	50	100	3	4
CE010 304	Mechanics of Solids I	3	1	-	50	100	3	4
CE010 305	Surveying I	3	1	-	50	100	3	4
CE010 306	Engineering Geology	3	1		50	100	3	4
CE010 307	*Material Testing Lab I*	-	-	3	50	100	3	2
CE010 308	*Surveying Practical I*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
CE010 402	Construction Engineering and Management	3	1	-	50	100	3	4
CE010 403	Mechanics of Solids II	2	2	-	50	100	3	4
CE010 404	Open Channel Flow and Hydraulic Machines	3	1	-	50	100	3	4
CE010 405	Surveying II	3	1	-	50	100	3	4
CE010 406	Civil Engineering Drawing			4	50	100	3	4
CE010 407	*Surveying Practical II*	-	-	3	50	100	3	2
CE010 408(ME)	*Hydraulics Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	-	**50**	**100**	3	4
CE010 502	Computer Programming	**3**	**1**		**50**	**100**	3	4
CE010 503	Design of Concrete Structures I	2	2	-	50	100	3	4
CE010 504	Geotechnical Engineering I	3	1	-	50	100	3	4
CE010 505	Quantity Surveying and Valuation	3	1	-	50	100	3	4
CE010 506	Structural Analysis I	3	1	-	50	100	3	4
CE010 507	*Computing Techniques Lab*	-	-	3	50	100	3	2
CE010 508	*Geotechnical Engineering Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
CE010 601	Design of Steel Structures	2	2	-	50	100	3	4
CE010 602	Geotechnical Engineering II	2	2	-	50	100	3	4
CE010 603	Structural Analysis II	3	1	-	50	100	3	4
CE010 604	Transportation Engineering I	3	1	-	50	100	3	4
CE010 605	Water Resources Engineering	3	1	-	50	100	3	4
CE010 606Lxx	Elective I	2	2	-	50	100	3	4
CE010 607	Computer Aided Design and Drafting Lab	-	-	3	50	100	3	2
CE010 608	*Material Testing Lab II*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

CE010 606L01 Advanced Surveying
CE010 606L02 Open Channel and Coastal Hydraulics
CE010 606L03 Airport Engineering
CE010 606L04 Advanced Mechnics of Materials
CE010 606L05 Concrete Technology
CE010 606L06 Soil Stability Analysis.

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
CE010 701	Design of Hydraulic Structures	2	2	-	50	100	3	4
CE010 702	Environmental Engineering I	2	2	-	50	100	3	4
CE010 703	Design of Concrete Structures II	2	1	-	50	100	3	3
CE010 704	Architecture and Town Planning	2	1	-	50	100	3	3
CE010 705	Transportation Engineering II	2	1	-	50	100	3	3
CE010 706Lxx	Elective II	2	2	-	50	100	3	4
CE010 707	Computer Applications Lab	-	-	3	50	100	3	2
CE010 708	*Transportation Engineering Lab*	-	-	3	50	100	3	2
CE010 709	Seminar	-	-	2	50	-	-	2
CE010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

CE010 706L01 Building Automation and Smart Structures
CE 010 706L02 Ground Improvement Technicques
CE 010 706L03. Prestressed Concrete.
CE 010 706L04 Environmental Impact Assessment
CE 010 706L05 Theory of Plates and Shells
CE 010 706L06 Traffic Engineering and Management

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
CE010 801	Advanced Structural Design	3	2	-	50	100	3	4
CE010 802	Building Technology and Management	2	2	-	50	100	3	4
CE010 803	Environmental Engineering II	2	2	-	50	100	3	4
CE010 804Lxx	Elective III	2	2	-	50	100	3	4
CE010 805Gxx	Elective IV	2	2	-	50	100	3	4
CE010 806	Environmental Engineering Lab	-	-	3	50	100	3	2
CE010 807	Project	-	-	6	100	-	-	4
CE010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

CE010 804L01 Advanced Foundation Design
CE010 804L02 Environmental Geotechniques
CE010 804L03 Earthquake Engineering and Design
CE010 804L04 Advanced Hydrology and System Analysis
CE010 804L05 Highway and Airfield Pavements
CE010 804L06 Structural Dynamics and Stability Analysis

Electives IV

CE010 805G01 Finite Element Analysis
CE010 805G02 Environmental Pollution Control Techniques
CE010 805G03 Optimization Techniques
CE010 805G04 Land Use Planning
CE010 805G05 Numerical Methods
CE010 805G06 Remote Sensing and GIS Applications

Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010 (Mechanical Engineering)
Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
ME010 303	Fluid Mechanics	2	2	-	50	100	3	4
ME 010 304	Metallurgy & Material Science	3	1	-	50	100	3	4
ME 010 305	Programming in C	3	1	-	50	100	3	4
ME 010 306(CE)	Strength of Materials & Structural Engineering	3	1	-	50	100	3	4
ME 010 307	*Computer ProgrammingLab*	-	-	3	50	100	3	2
ME 010 308	*Fluid Mechanics Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
ME 010 403	Hydraulic Machines	2	2	-	50	100	3	4
ME 010 404	Manufacturing Process	3	1	-	50	100	3	4
ME 010 405	Machine Drawing			4	50	100	3	4
ME 010 406(EE)	Electrical Technology	3	1	-	50	100	3	4
ME 010 407	*Hydraulic Machines Lab*	-	-	3	50	100	3	2
ME 010 408(CE)	*Strength of Materials Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	**-**	**50**	**100**	3	4
ME 010 502	Computer Aided Design & Manufacturing	**3**	**1**		**50**	**100**	3	4
ME 010 503	Advanced Mechanics of Materials	2	2	-	50	100	3	4
ME 010 504	Kinematics of Machinery	3	1	-	50	100	3	4
ME 010 505	I.C.Engines & Combustion	3	1	-	50	100	3	4
ME 010 506	Thermodynamics	3	1	-	50	100	3	4
ME 010 507	*CAD/CAM Lab*	-	-	3	50	100	3	2
ME 010 508	*Electrical & Electronics Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
ME 010 601	Mechanics of Machines	2	2	-	50	100	3	4
ME 010 602	Heat & Mass transfer	2	2	-	50	100	3	4
ME 010 603	Thermal Systems & Applications	3	1	-	50	100	3	4
ME 010 604	Metrology & Machine Tools	3	1	-	50	100	3	4
ME 010 605	Mechatronics & Control System	3	1	-	50	100	3	4
ME 010 606Lxx	Elective I	2	2	-	50	100	3	4
ME 010 607	Heat Engines Lab	-	-	3	50	100	3	2
ME 010 608	*Machine Tools Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

ME 010 606L01 Computational Fluid Dynamics
ME 010 606L02 Composite Matérials Technology
ME 010 606L03 Automobile engineering
ME 010 606L04 Advanced strength of materials
ME 010 606L05 Industrial Hydraulics
ME 010 606L06 Project management

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
ME 010 701	Design of Machine Elements	2	1	1	50	100	3	4
ME 010 702	Dynamics of Machines	2	2	-	50	100	3	4
ME 010 703	Gas Dynamics & Jet Propulsion	2	1	-	50	100	3	3
ME 010 704	Refrigeration & Air Conditioning	2	1	-	50	100	3	3
ME 010 705	Industrial Engineering	2	1	-	50	100	3	3
ME 010 706Lxx	Elective II	2	2	-	50	100	3	4
ME 010 707	Mechanical Measurements Lab	-	-	3	50	100	3	2
ME 010 708	*Advanced Machine Tools Lab*	-	-	3	50	100	3	2
ME 010 709	Seminar	-	-	2	50	-	-	2
ME 010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**8**	**10**				**28**

Elective II

ME010 706L01 Plant Engineering & Maintanance
ME010 706L02 Turbomachines
ME010 706L03 Theory of vibration
ME010 706L04 Sales& Marketing Management
ME010 706L05 Failure analysis & design
ME010 706L06 Foundary & Welding Technology

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
ME010 801	Design of Transmission Elements	2	2	1	50	100	3	4
ME010 802	Operations Management	2	2	-	50	100	3	4
ME010 803	Production Engineering	2	2	-	50	100	3	4
ME010 804Lxx	Elective III	2	2	-	50	100	3	4
ME010 805Gxx	Elective IV	2	2	-	50	100	3	4
ME010 806	Mechanical Systems Lab	-	-	3	50	100	3	2
ME010 807	Project	-	-	6	100	-	-	4
ME010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**10**	**10**	**10**				**28**

Electives III

ME010 804L01 Aerospace Engineering
ME010 804L02 Advanced Machining Process
ME010 804L03 Cryogenics
ME010 804L04 Acoustics & noise control
ME010 804L05 Non Destructive Testing
ME010 804L06 Advance operations research

Electives IV

ME010 805G01 Industrial Safety
ME010 805G02 Disaster Management
ME010 805G03 Nano Technology
ME010 805G04 Finite element analysis
ME010 805G05 Optimization methods in design
ME010 805G06 Petrochemical Engineering

Mahatma Gandhi University Revised Scheme For B Tech Syllabus Revision 2010

Electrical & Electronics Engineering.

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duratio	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
EE 010 303	Electric Circuit Theory	2	2	-	50	100	3	4
EE010 304	Electrical Measurements and Measuring Instruments	3	1	-	50	100	3	4
EE 010 305	Electronic Circuits	3	1	-	50	100	3	4
EE 010 306(ME)	Mechanical Technology	3	1	-	50	100	3	4
EE010 307	Electrical Measurements Lab	-	-	3	50	100	3	2
EE 010 308	Mechanical Lab	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EE 010 402	DC Machines and Transformers	3	1	-	50	100	3	4
EE 010 403	Linear System Analysis	2	2	-	50	100	3	4
EE010 404	Electromagnetic Theory	3	1	-	50	100	3	4
EE 010 405	Digital Systems and Computer Organization	3	1	-	50	100	3	4
EE 010 406	Computer Programming	3	1	-	50	100	3	4
EE 010 407	Computer Programming Lab			3	50	100	3	2
EE 010 408	Electronic Circuits Lab	-	-	3	50	100	3	2
	Total	16	8	6				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	-	**50**	**100**	3	4
EN 010 502(ME)	Principles of Management	**3**	**1**		**50**	**100**	3	4
EE 010 503	Signals and Systems	2	2	-	50	100	3	4
EE010 504	Power Electronics	3	1	-	50	100	3	4
EE 010 505	Linear Integrated Circuits	3	1	-	50	100	3	4
EE 010 506	Microprocessors and Applications	3	1	-	50	100	3	4
EE010 507	Electrical Machines Lab I	-	-	3	50	100	3	2
EE010 508	Integrated Circuits Lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EE 010 601	Power Generation and Distribution	2	2	-	50	100	3	4
EE 010 602	Induction Machines	3	1	-	50	100	3	4
EE 010 603	Control Systems	2	2	-	50	100	3	4
EE 010 604	Digital Signal Processing	3	1	-	50	100	3	4
EE 010 605	Microcontrollers and Embedded Systems	3	1	-	50	100	3	4
EE 010 606Lxx	Elective I	2	2	-	50	100	3	4
EE 010 607	Power Electronics Lab	-	-	3	50	100	3	2
EE 010 608	Microprocessor and Microcontroller Lab	-	-	3	50	100	3	2
	Total	15	9	6				**28**

Elective I

EE 010 606L01 High Voltage Engineering
EE 010 606L02 VLSI systems
EE 010 606L03 Artificial Neural Networks
EE 010 606L04 Object Oriented Programming
EE 010 606L05 Bio - medical engineering
EE 010 606L06 Renewable energy Sources

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 701	Electrical Power Transmission	2	**2**	-	50	100	3	4
EE 010 702	Synchronous Machines	2	**1**	-	50	100	3	4
EE010 703	Drives and Control	2	**2**	-	50	100	3	3
EE010 704	Modern Control Theory	2	**1**	-	50	100	3	3
EE010 705	Communication Engineering	2	**1**	-	50	100	3	3
EE 010 706Lxx	Elective II	2	**2**	-	50	100	3	4
EE010 707	Electrical CAD	-	-	**3**	50	100	3	2
EE 010 708	Control and Simulation Lab	-	-	**3**	50	100	3	2
EE010 709	Seminar	-	-	**2**	50	-	-	2
EE 010 710	Project	-	-	-	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

EE010	706L01	H V D C Transmission
EE010	706L02	Industrial Instrumentation
EE010	706L03	Power Quality
EE010	706L04	PLC Based systems
EE010	706L05	MEMS Technology
EE010	706L06	Special Electrical Machines

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EE010 801	Power System Analysis	2	2	-	50	100	3	4
EE010 802	Switch Gear and Protection	2	2	-	50	100	3	4
EE 010 803	Electrical System Design	3	2	-	50	100	3	4
EE010 804Lxx	Elective III	2	2	-	50	100	3	4
EE 010 805Gxx	Elective IV	2	2	-	50	100	3	4
EE 010 806	Electrical Machines Lab II	-	-	3	50	100	3	2
EE010 807	Project	-	-	6	100	-	-	4
EE 010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

EE010	804L01	Advanced Power System
EE010	804L02	Computer Networks
EE010	804L03	Generalized Machine Theory
EE010	804L04	Finite Element applications in Electrical Engineering.
EE010	804L05	Digital Signal Processors
EE010	804L06	Opto Electronics

Electives IV

EE010	805G01	Soft Computing Techniques
EE010	805G02	Intellectual property rights
EE010	805G03	Advanced Mathematics
EE010	805G04	Virtual Instrumentation
EE010	805G05	Digital Image Processing
EE010	805G06	Distributed Power Systems

Mahatma Gandhi University Revised Scheme For B Tech Syllabus Revision 2010 (Electronics & Communication Engineering)

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	0	-	3	50	-	3	1
EN010 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
EC010 303	Network Theory	2	2	-	50	100	3	4
EC010 304	Solid State Devices	3	1	-	50	100	3	4
EC010 305	Analog Circuits - I	3	1	-	50	100	3	4
EC010 306	Computer Programming	3	1	-	50	100	3	4
EC010 307	*Analog Circuits Lab*	-	-	3	50	100	3	2
EC010 308	*Programming Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management(C,M,P,L,A,T)	3	1	-	50	100	3	4
EC010 403	Signals and Systems	2	2	-	50	100	3	4
EC010 404	Digital Electronics	3	1	-	50	100	3	4
EC010 405	Analog Communication	3	1	-	50	100	3	4
EC010 406	Analog Circuits -II	3	1	-	50	100	3	4
EC010 407	*Analog Circuits -II Lab*	-	-	3	50	100	3	2
EC010 408	*Analog Communication Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	-	**50**	**100**	3	4
EC010 502	Control Systems	**2**	**2**		**50**	**100**	3	4
EC010 503	Digital System Design	3	1	-	50	100	3	4
EC010 504(EE)	Electrical Drives and Control	3	1	-	50	100	3	4
EC010 505	Applied Electromagnetic Theory	3	1	-	50	100	3	4
EC010 506	Microprocessors and Applications	3	1	-	50	100	3	4
EC010 507	*Digital Electronics Lab*	-	-	3	50	100	3	2
EC010 508(EE)	*Electrical Drives and Control Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EC010 601	Digital Communication Techniques	2	2	-	50	100	3	4
EC010 602	Digital Signal Processing	2	2	-	50	100	3	4
EC010 603	Radiation and Propagation	3	1	-	50	100	3	4
EC010 604	Computer Architecture and Parallel Processing	3	1	-	50	100	3	4
EC010 605	Microcontrollers and Applications	3	1	-	50	100	3	4
EC010 606Lxx	Elective I	3	1	-	50	100	3	4
EC010 607	*Microprocessor and Microcontroller Lab*	-	-	3	50	100	3	2
EC010 608	*Mini Project Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

Elective I

EC010 606L01 – Data Structures and Algorithms
EC010 606L02 – Data Base Management Systems
EC010 606L03 – High Speed Digital Design
EC010 606L04 – Medical Electronics
EC010 606L05 – Soft Computing Techniques
EC010 606L06 – Television and Radar Engineering

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EC010 701	VLSI Design	2	2	-	50	100	3	4
EC010 702	Information Theory and Coding	2	2	-	50	100	3	4
EC010 703	Microwave Engineering	2	1	-	50	100	3	3
EC010 704	Electronic Instrumentation	2	1	-	50	100	3	3
EC010 705	Embedded Systems	2	1	-	50	100	3	3
EC010 706Lxx	Elective II	2	2	-	50	100	3	4
EC010 707	*Advanced Communication Lab*	-	-	3	50	100	3	2
EC010 708	*Signal Processing Lab*	-	-	3	50	100	3	2
EC010 709	Seminar	-	-	2	50	-	-	2
EC010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

EC010 706L01 – Optimization Techniques
EC010 706L02 – Speech and Audio Processing
EC010 706L03 – Digital Image Processing
EC010 706L04 – Wavelets and Applications
EC010 706L05 – Antenna Theory and Design
EC010 706L06 – System Software

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EC010 801	Wireless Communication	3	2	-	50	100	3	4
EC010 802	Communication Networks	2	2	-	50	100	3	4
EC010 803	Light Wave Communication	2	2	-	50	100	3	4
EC010 804Lxx	Elective III	2	2	-	50	100	3	4
EC010 805Gxx	Elective IV	2	2	-	50	100	3	4
EC010 806	*VLSI and Embedded Systems Lab*	-	-	3	50	100	3	2
EC010 807	Project	-	-	6	100	-	-	4
EC010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

EC010 804L01 – Nano Electronics
EC010 804L02 – Micro Electro Mechanical Systems
EC010 804L03 – Secure Communication
EC010 804L04 – Management Information Systems
EC010 804L05 – Pattern Recognition
EC010 804L06 – R F Circuits

Electives IV

EC010 805G01 – Test Engineering
EC010 805G02 – E-Learning
EC010 805G03 – Mechatronics
EC010 805G04 – Bio Informatics
EC010 805G05 – Intellectual Property Rights
EC010 805G06 – Professional Ethics

Mahatma Gandhi University Revised Scheme For B Tech Syllabus Revision 2010 (Electronics & Instrumentation Engineering)

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN010 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
EI010 303	Network Theory	2	2	-	50	100	3	4
EI010 304	Electronic Devices and Circuits I	3	1	-	50	100	3	4
EI010 305	Basic Instrumentation	3	1	-	50	100	3	4
EI010 306	Computer Programming	3	1	-	50	100	3	4
EI010 307	*Electronic circuits lab I*	-	-	3	50	100	3	2
EI010 308	*Programming Lab(C,C++,Matlab)*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
EI010 403	Signals&Systems	2	2	-	50	100	3	4
EI010 404	Digital Electronics	3	1	-	50	100	3	4
EI010 405	Electronic instrumentation	3	1	-	50	100	3	4
EI010 406	Elecronic Devices and Circuits II	3	1	-	50	100	3	4
EI010 407	*Electronic circuits Lab II*	-	-	3	50	100	3	2
EI010 408	*Basic Instrumentation Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	**-**	**50**	**100**	3	4
EI010 502	Industrial electronics and applications	**3**	**1**		**50**	**100**	3	4
EI010 503	Linear integrated circuits and applications	3	1	-	50	100	3	4
EI010 504	Transducer engineering	3	1	-	50	100	3	4
EI010 505	Control engineering I	2	2	-	50	100	3	4
EI010 506	Microprocessors and Microcontrollers	3	1	-	50	100	3	4
EI010 507	*Instrumentation lab I*	-	-	3	50	100	3	2
EI010 508	*Integrated circuits lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EI010 601	Process Control Instrumentation	3	1	-	50	100	3	4
EI010 602	Digital Signal Processing	2	2	-	50	100	3	4
EI010 603	Industrial instrumentation I	3	1	-	50	100	3	4
EI010 604	Data acquisition and communication	3	1	-	50	100	3	4
EI010 605	Control engineering II	2	2	-	50	100	3	4
EI010 606Lxx	Elective I	3	1	-	50	100	3	4
EI010 607	*Microprocessor and Microcontroller Lab*	-	-	3	50	100	3	2
EI010 608	*Mini Project*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

Elective I

EI010 606L01 – Digital system design
EI010 606L02 – Data Base Management Systems
EI010 606L03 – Computer networks
EI010 606L04 – micro controller based system design
EI010 606L05 – Telimetry and remote control
EI010 606L06 – Robotics and automation

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EI010 701	Fibre Optics and Laser Instrumentation	2	2	-	50	100	3	4
EI010 702	Computerised Process Control	2	2	-	50	100	3	4
EI010 703	Biomedical Instrumentation	2	1	-	50	100	3	3
EI010 704	Analytical Instrumentation	2	1	-	50	100	3	3
EI010 705	Industrial Instrumentation II	2	1	-	50	100	3	3
EI010 706Lxx	Elective II	2	2	-	50	100	3	4
EI010 707	*Instrumentation lab II*	-	-	3	50	100	3	2
EI010 708	*System simulation lab*	-	-	3	50	100	3	2
EI010 709	Seminar	-	-	2	50	-	-	2
EI010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

EI010 706L01 – Optimization Techniques
EI010 706L02 – VLSI Technology
EI010 706L03 – Digital Image Processing
EI010 706L04 – Applied soft computing
EI010 706L05 – Instrumentation in petrochemical industries
EI010 706L06 – Reliability and safety engineering

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EI010 801	Instrumentation System Design	3	2	-	50	100	3	4
EI010 802	Instrumentation in Process Industries	2	2	-	50	100	3	4
EI010 803	Advanced Instrumentation and Applications	2	2	-	50	100	3	4
EI010 804Lxx	Elective III	2	2	-	50	100	3	4
EI010 805Gxx	Elective IV	2	2	-	50	100	3	4
EI010 806	*Process control lab*	-	-	3	50	100	3	2
EI010 807	Project	-	-	6	100	-	-	4
EI010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

EI010 804L01 – Nano Electronics
EI010 804L02 – Micro Electro Mechanical Systems
EI010 804L03 –Biomedical signal processing
EI010 804L04 –Real time embedded systems
EI010 804L05 –Environmental monitoring instruments
EI010 804L06 –Air craft instrumentation

Electives IV

EI010 805G01 – Test Engineering
EI010 805G02 – Total quality management
EI010 805G03 –Human factors engineering
EI010 805G04 – Bio Informatics
EI010 805G05 – Intellectual Property Rights
EI010 805G06 – Professional Ethics

Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010
Instumentation & Control Engineering
Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN010 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
IC010 303	Network Theory	2	2	-	50	100	3	4
IC010 304	Analog Devices & Circuits	3	1	-	50	100	3	4
IC010 305	Basic Instrumentation & Measurements Engineering	3	1	-	50	100	3	4
IC010 306	Computer Programming	3	1	-	50	100	3	4
IC010 307	*Basic Electronics Laboratory*	-	-	3	50	100	3	2
IC010 308	*Programming Lab(C,C++,Matlab)*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
IC010 403	Transducer Engineering	2	2	-	50	100	3	4
IC010 404	Digital Electronics	3	1	-	50	100	3	4
IC010 405	Electrical Engineering	3	1	-	50	100	3	4
IC010 406	Mechanical Engineering	3	1	-	50	100	3	4
IC010 407	*Electrical Machines Laboratory*	-	-	3	50	100	3	2
IC010 408	*Digital IC Laboratory*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	**-**	**50**	**100**	3	4
IC010 502	Industrial Electronics & Applications	**2**	**2**		**50**	**100**	3	4
IC010 503	Electronic Instrumentation	3	1	-	50	100	3	4
IC010 504	Linear Integrated Circuits	3	1	-	50	100	3	4
IC010 505	Linear Control System	3	1	-	50	100	3	4
IC010 506	Microprocessors and Microcontrollers	3	1	-	50	100	3	4
IC010 507	*Microprocessor & Microcontroller Lab*	-	-	3	50	100	3	2
IC010 508	*Linear Integrated Circuits Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
IC010 601	Process Control Instrumentation	2	2	-	50	100	3	4
IC010 602	Principles of Telemetry & Communication	2	2	-	50	100	3	4
IC010 603	Industrial Instrumentation – I	3	1	-	50	100	3	4
IC010 604	Signals & Systems with Processing	3	1	-	50	100	3	4
IC010 605	Advanced Control Systems	3	1	-	50	100	3	4
IC010 606Lxx	Elective-I	3	1	-	50	100	3	4
IC010 607	*Industrial Instrumentation Laboratory*	-	-	3	50	100	3	2
IC010 608	*Mini Project*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

Elective I

IC010 606L01 – Mechatronics
IC010 606L02 – Computer Networks & Protocols
IC010 606L03 – Advanced Microcontrollers
IC010 606L04 – Embedded System Design
IC010 606L05 – Digital System Design
IC010 606L06 – Data Structures & Algorithm

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
IC010 701	Computer Control of Industrial Process	2	2	-	50	100	3	4
IC010 702	Optical and opto Electronic Instrumentation	2	2	-	50	100	3	4
IC010 703	Biomedical Instrumentation	2	1	-	50	100	3	3
IC010 704	Analytical Instrumentation	2	1	-	50	100	3	3
IC010 705	Industrial Instrumentation-II	2	1	-	50	100	3	3
IC010 706Lxx	Elective II	2	2	-	50	100	3	4
IC010 707	*Process Control Laboratory*	-	-	3	50	100	3	2
IC010 708	*Mechanical Measurements Laboratory*	-	-	3	50	100	3	2
IC010 709	Seminar	-	-	2	50	-	-	2
IC010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

IC010 706L01 – Artificial Intelligence & Expert Systems
IC010 706L02 – Robotics & Automation
IC010 706L03 – Embedded Instrumentation System
IC010 706L04 – Ultrasonic Instrumentation
IC010 706L05 – VLSI Design
IC010 706L06 – Virtual Instrumentation

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
IC010 801	Instrumentation System Design	3	2	-	50	100	3	4
IC010 802	Power Plant Instrumentation	2	2	-	50	100	3	4
IC010 803	Instrumentation & Control in Petrochemical Industries	2	2	-	50	100	3	4
IC010 804Lxx	Elective III	2	2	-	50	100	3	4
IC010 805Gxx	Elective IV	2	2	-	50	100	3	4
IC010 806	*System Simulation Laboratory*	-	-	3	50	100	3	2
IC010 807	Project	-	-	6	100	-	-	4
IC010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

IC010 804L01 – Intelligent Control System
IC010 804L02 – Automotive Instrumentation
IC010 804L03 – Instrumentation & Control Paper Industries
IC010 804L04 – Digital Image Processing techniques
IC010 804L05 – Instrumentation & Control in Aerospace & Navigation
IC010 804L06 – Telecommunication & Switching networks

Electives IV

IC010 805G01 – Test Engineering
IC010 805G02 – Multimedia Systems
IC010 805G03 – Total Quality Management
IC010 805G04 – Bio Informatics
IC010 805G05 – Intellectual Property Rights
IC010 805G06 – Professional Ethics

Mahatma Gandhi University Revised Scheme For B Tech Syllabus Revision 2010

Applied Electronics and Instrumentation Engineering

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duratio	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
AI010 303	Network Theory	2	2	-	50	100	3	4
AI010 304	Solid State devices	3	1	-	50	100	3	4
AI010 305	Analog Circuits I	3	1	-	50	100	3	4
AI010 306	Computer Programming	3	1	-	50	100	3	4
AI010 307	Analog circuits Lab	-	-	3	50	100	3	2
AI010 308	Programming Lab	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
AI010 403	Signals and Systems	2	2	-	50	100	3	4
AI010 404	Digital Electronics	3	1	-	50	100	3	4
AI010 405	Signal Communication	3	1	-	50	100	3	4
AI010 406	Analog circuits II	3	1	-	50	100	3	4
AI010 407	Analog circuits II lab			3	50	100	3	2
AI010 408	Digital IC lab	-	-	3	50	100	3	2
	Total	16	8	6				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	2	2	-	**50**	**100**	3	4
AI010 502	Industrial Electronics and Applications	3	1	-	**50**	**100**	3	4
AI010 503	Basic Instrumentation & recording system	3	1	-	50	100	3	4
AI010 504	Data Acquisition system	3	1	-	50	100	3	4
AI010 505	Control Engineering I	2	2	-	50	100	3	4
AI010 506	Microprocessors and microcontrollers	3	1	-	50	100	3	4
AI010 507	Industrial Electronics Lab	-	-	3	50	100	3	2
AI010 508	Measurements lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AI010 601	Process Control Instrumentation	3	1	-	50	100	3	4
AI010 602	Digital Signal Processing	2	2	-	50	100	3	4
AI010 603	Industrial Instrumentation I	3	1	-	50	100	3	4
AI010 604	Microcontroller based system design	3	1	-	50	100	3	4
AI010 605	Control Engineering II	2	2	-	50	100	3	4
AI010 606Lxx	Elective I	3	1	-	50	100	3	4
AI010 607	Microprocessors & microcontrollers lab	-	-	3	50	100	3	2
AI010 608	Mini Project	-	-	3	50	100	3	2
	Total	15	9	6				**28**

Elective I

AI 010 606L01 Mechatronics
AI 010 606L02 Micro Electronics
AI 010 606L03 Digital system design
AI 010 606L04 Industrial safety engineering
AI 010 606L05 Reliability Engineering
AI 010 606L06 Energy management

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AI010 701	VLSI	2	2	-	50	100	3	4
AI010 702	Computerised Process control	2	2	-	50	100	3	4
AI010 703	Biomedical Instrumentation	2	1	-	50	100	3	3
AI010 704	Analytical instrumentation	2	1	-	50	100	3	3
AI010 705	Industrial Instrumentation II	2	1	-	50	100	3	3
AI010 706Lxx	Elective II	2	2	-	50	100	3	4
AI010 707	Industrial Instrumentation Lab	-	-	3	50	100	3	2
AI010 708	DSP lab	-	-	3	50	100	3	2
AI010 709	Seminar	-	-	**2**	50	-	-	2
AI010 710	Project	-	-	-	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

AI010	706L01	Robotics
AI010	706L02	Real Time system
AI010	706L03	Optimization techniques
AI010	706L04	Fuzzy Logic
AI010	706L05	Digital Image processing
AI010	706L06	Advanced microcontrollers

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AI010 801	Instrumentation system design	3	2	-	50	100	3	4
AI010 802	Instrumentation in process industries	2	2	-	50	100	3	4
AI010 803	Computer Networks	2	2	-	50	100	3	4
AI010 804 Lxx	Elective III	2	2	-	50	100	3	4
AI010 805 Gxx	Elective IV	2	2	-	50	100	3	4
AI010 806	Process Control Lab	-	-	3	50	100	3	4
AI010 807	Project	-	-	6	100	-	-	2
AI010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

AI010	804L01	Neural networks
AI010	804L02	Advanced DSP
AI010	804L03	Embedded systems
AI010	804L04	Artificial Intelligence
AI010	804L05	VHDL
AI010	804L06	BioInformatics

Electives IV

AI010	805G01	Total quality management
AI010	805G02	Human factors engineering
AI010	805G03	System engineering
AI010	805G04	Professional Ethics
AI010	805G05	Industrial Pollution control
AI010	805G06	Simulation and modelling

Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010 (Computer Science & Engineering)

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering Chemistry& Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engg. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	Electrical and Civil Workshops	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks			
		L	T	P/D	Inte-rnal	End-sem		
EN010 301B	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
CS010 303	Problem Solving and Computer Programming	2	2	-	50	100	3	4
CS010 304	Computer Organization	3	1	-	50	100	3	4
CS010 305	Switching Theory and Logic Design	3	1	-	50	100	3	4
CS010 306(EC)	Electronics Devices and Circuits	3	1	-	50	100	3	4
CS010 307	Programming lab	-	-	3	50	100	3	2
CS010 308(EC)	Logic Design lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
CS010 402	Object Oriented Programming	3	1		50	100	3	4
CS010 403	Data Structures and Algorithms	2	2	-	50	100	**3**	4
CS010 404(EC)	Signals &Communication Systems	3	1	-	50	100	3	4
CS010 405	Microprocessor Systems	3	1	-	50	100	3	4
CS010 406	Theory of Computation	3	1	-	50	100	3	4
CS010 407	Data Structures lab	-	-	3	50	100	3	2
CS010 408(EC)	Electronic Circuits lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501B	Engineering Mathematics IV	2	2	-	50	100	3	4
EN010 502(ME)	Principles of Management	3	1		50	100	3	4
CS010 503	Database Management Systems	2	2	-	50	100	3	4
CS010 504(EC)	Digital Signal Processing	3	1	-	50	100	3	4
CS010 505	Operating Systems	3	1	-	50	100	3	4
CS010 506	Advanced Microprocessors & Peripherals	3	1	-	50	100	3	4
CS010 507(P)	Database Lab	-	-	3	50	100	3	2
CS010 508(P)	Hardware & Microprocessors lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
CS010 601	Design and Analysis of Algorithms	2	2	-	50	100	3	4
CS010 602	Internet Computing	2	2	-	50	100	3	4
CS010 603	System Software	3	1	-	50	100	3	4
CS010 604	Computer Networks	3	1	-	50	100	3	4
CS010 605	Software Engineering	3	1	-	50	100	3	4
CS010 606Lxx	Elective I	2	2	-	50	100	3	4
CS010 607	Operating Systems Lab	-	-	3	50	100	3	2
CS010 608	Mini Project	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

CS010 606L01	Distributed Systems
CS010 606L02	Micro controller Based Systems
CS010 606L03	User Interface Design
CS010 606L04	Unix Shell Programming
CS010 606L05	Embedded Systems
CS010 606L06	Advanced Software Environments

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
CS010 701	Web Technologies	2	2	-	50	100	3	4
CS010 702	Compiler Construction	2	2	-	50	100	3	4
CS010 703	Computer Graphics	2	1	-	50	100	3	3
CS010 704	Object Oriented Modelling & Design	2	1	-	50	100	3	3
CS010 705	Principles of Programming Languages	2	1	-	50	100	3	3
CS010 706Lxx	Elective II	2	2	-	50	100	3	4
CS010 707	Systems Programming Lab	-	-	3	50	100	3	2
CS010 708	Networking lab	-	-	3	50	100	3	2
CS010 709	Seminar	-	-	2	50	-	-	2
CS010 710	Project	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

CS010 706L01	Real Time Systems
CS010 706L02	Data Mining and Data Warehousing
CS010 706L03	Operating System Kernel Design
CS010 706L04	Digital image processing
CS010 706L05	Data Processing and File Structures
CS010 706L06	Client Server Architecture and Applications

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
CS010 801	High Performance Computing	3	2	-	50	100	3	4
CS010 802	Artificial Intelligence	2	2	-	50	100	3	4
CS010 803	Security in Computing	2	2	-	50	100	3	4
CS010 804Lxx	Elective III	2	2	-	50	100	3	4
CS010 805Gxx	Elective IV	2	2	-	50	100	3	4
CS010 806	Computer Graphics Lab	-	-	3	50	100	-	2
CS010 807	Project	-	-	6	100	0	3	4
CS010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Elective III

CS010 804L01	E-commerce
CS010 804L02	Grid Computing
CS010 804L03	Bioinformatics
CS010 804L04	Optimization Techniques
CS010 804L05	Mobile Computing
CS010 804L06	Advanced Networking Trends

Elective IV

CS010 805G01	Multimedia Techniques
CS010 805G02	Neural networks
CS010 805G03	Advanced Mathematics
CS010 805G04	Software Architecture
CS010 805G05	Natural Language Processing
CS010 805G06	Pattern Recognition

Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010
Information Technology
Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	Electrical and Civil Workshops	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301B	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
IT010 303 (EC)	Discrete and Integrated Electronic Circuits	2	2	-	50	100	3	4
IT010 304	Switching Theory and Logic Design	3	1	-	50	100	3	4
IT010 305(EC)	Principles of Communication Engineering	3	1	-	50	100	3	4
IT010 306	Problem Solving and Computer Programming	3	1	-	50	100	3	4
IT010 307 (EC)	*Electronic Circuits and Communication Lab*	-	-	3	50	100	3	2
IT010 308	*Programming Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
IT010 403	Computer Organisation and Architecture	2	2	-	50	100	3	4
IT010 404	Theory of Computation	3	1	-	50	100	3	4
IT010 405	Data Structures and Algorithms	3	1	-	50	100	3	4
IT010 406	Object Oriented Techniques	3	1	-	50	100	3	4
IT010 407	*Logic Design Lab*	-	-	3	50	100	3	2
IT010 408	*Data Structures and Programming Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501B	Engineering Mathematics IV	**2**	**2**	**-**	**50**	**100**	3	4
IT010 502	Microprocessors and Microcontrollers	**3**	**1**		**50**	**100**	3	4
IT010 503	Data Communication	2	2	-	50	100	3	4
IT010 504	Operating Systems	3	1	-	50	100	3	4
IT010 505	Language Translators	3	1	-	50	100	3	4
IT010 506	Database Management Systems	3	1	-	50	100	3	4
IT010 507	*PC Hardware and Microprocessors Lab*	-	-	3	50	100	3	2
IT010 508	*Systems Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
IT010 601	Computer Networks	2	2	-	50	100	3	4
IT010 602(EC)	Digital Signal Processing	2	2	-	50	100	3	4
IT010 603(EC)	Information Theory and Coding	3	1	-	50	100	3	4
IT010 604	Software Engineering	3	1	-	50	100	3	4
IT010 605	Design and Analysis of Algorithms	3	1	-	50	100	3	4
IT010 606Lxx	Elective I	2	2	-	50	100	3	4
IT010 607	Network Programming Lab	-	-	3	50	100	3	2
IT010 608	*Mini Project*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

IT010 606L01 Simulation and Modelling

IT010 606L02 Management Information Systems

IT010 606L03 UNIX Shell Programming

IT010 606L04 Advanced Database Systems

IT010 606L05 Parallel Computing

IT010 606L06 Optimization Techniques

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
IT010 701	Financial Management and E-Banking	2	2	-	50	100	3	4
IT010 702	Object Oriented Modelling and Design	2	2	-	50	100	3	4
IT010 703	Computer Graphics and Multimedia Systems	2	1	-	50	100	3	3
IT010 704	Internetworking	2	1	-	50	100	3	3
IT010 705	Web Applications Development	2	1	-	50	100	3	3
IT010 706Lxx	Elective II	2	2	-	50	100	3	4
IT010 707	Internetworking Lab	-	-	3	50	100	3	2
IT010 708	Computer Aided Software Engineering Lab	-	-	3	50	100	3	2
IT010 709	Seminar	-	-	2	50	-	-	2
IT010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

IT010 706L01 Software Project Management

IT010 706L02 Optical Communication Networks

IT010 706 L03 Digital Speech and Image Processing

IT010 706L04 Real Time Systems

IT010 706L05 Operating System Kernel Design

IT010 706L06 Data Mining and Data Warehousing

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
IT010 801	Wireless Communication	3	2	-	50	100	3	4
IT010 802	Cryptography and Network Security	2	2	-	50	100	3	4
IT010 803	Artificial Intelligence	2	2	-	50	100	3	4
IT010 804Lxx	Elective III	2	2	-	50	100	3	4
IT010 805Gxx	Elective IV	2	2	-	50	100	3	4
IT010 806	Web Applications Lab	-	-	3	50	100	3	2
IT010 807	Project	-	-	6	100	-	-	4
IT010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

IT010 804L01 Software Testing
IT010 804L02 Information Retrieval
IT010 804L03 High Speed Networks
IT010 804L04 Network Administration and Management
IT010 804L05 Enterprise Resource Planning
IT010 804L06 Grid Computing

Electives IV

IT010 805G01 Software Architecture
IT010 805G02 Advanced Mathematics
IT010 805G03 Ad Hoc and Sensor Networks
IT010 805G04 Electronic Business and Services
IT010 805G05 Neural Networks
IT010 805G06 Soft Computing

Mahatma Gandhi University Revised Scheme For B Tech Syllabus Revision 2010 (Polymer Engineering)

Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	Mechanical Workshop	0	-	3	50	-	3	1
EN110 111	Electrical and Civil Workshops	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
PO010 303	Polymer Science - I	2	2	-	50	100	3	4
PO010 304 (CS)	Computer Programming	3	1	-	50	100	3	4
PO010 305	Organic Chemistry	3	1	-	50	100	3	4
PO010 306 (CE)	Strength of Materials & Structural Engineering	3	1	-	50	100	3	4
PO010 307	Chemistry Lab	-	-	3	50	100	3	2
PO010 308 (CS)	Computer Lab	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management (ME,AU,PO,EC,IT)	3	1	-	50	100	3	4
PO010 403	Polymer Physics	2	2	-	50	100	3	4
PO010 404	Polymer Science - II	3	1	-	50	100	3	4
PO010 405	Chemical Engineering - I	3	1	-	50	100	3	4
PO010 406 (EE)	Electrical Technology	3	1	-	50	100	3	4
PO010 407	Polymer Preparation & Characterisation Lab	-	-	3	50	100	3	2
PO010 408 (EE)	Electrical Machines Lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501	Engineering Mathematics IV	2	2	-	50	100	3	4
PO010 502	Plastics – Science & Technology	3	1		50	100	3	4
PO010503	Polymer Processing - I	2	2	-	50	100	3	4
PO010 504	Chemical Engineering - II	3	1	-	50	100	3	4
PO010 505	Latex Technology	3	1	-	50	100	3	4
PO010 506	Rubbers – Science & Technology	3	1	-	50	100	3	4
PO010 507	Specification Tests Lab	-	-	3	50	100	3	2
PO010 508	Polymer Analysis Lab	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
PO010 601	Engineering Statistics & Quality Control	2	2	-	50	100	3	4
PO010 602	Polymer Processing –II	2	2	-	50	100	3	4
PO010 603	Industrial Engineering	3	1	-	50	100	3	4
PO010 604	Chemical Engineering - III	3	1	-	50	100	3	4
PO010 605	Polymer Blends & Composites	3	1	-	50	100	3	4
PO010 606L	Elective I	2	2	-	50	100	3	4
PO010 607	Latex Product Lab	-	-	3	50	100	3	2
PO010 608	Product Manufacturing Lab	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

PO010 606L01… Bio Medical & Bio Polymers
PO 010 606L02…… Information Technology
PO 010 606L03.....Engineering Economics & Industrial Management.
PO 010 606L04.....Total Quality Management & Reliability Engineering
PO 010 606L05.....Production Engineering
PO 010 606L06.....Project Management

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
PO010 701	Polymer Machinery, Moulds & Dies	2	2	-	50	100	3	3
PO010 702	Polymer Testing	2	2	-	50	100	3	3
PO010 703	Plastic Products - Design &Testing	2	1	-	50	100	3	3
PO010 704	Chemical Engineering - IV	2	1	-	50	100	3	4
PO010 705	Tyre Technology	2	1	-	50	100	3	4
PO010 706 L	Elective II	2	2	-	50	100	3	4
PO010 707	Chemical Engineering Lab	-	-	3	50	100	3	2
PO010 708	Polymer Testing Lab	-	-	3	50	100	3	2
PO010 709	Seminar	-	-	2	50	-	-	2
PO010 710	Project	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

PO 010 706L01… Paints & Surface Coatings
PO 010 706L02.....Plastics Packaging Technology
PO 010 706L03.....Process Engineering Economics & Management
PO 010 706L04.....Process Control & Instrumentation
PO 010 706L05…… Object Oriented Programming
PO 010 706L06.....Introduction to Photonics

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
PO010 801	Polymers & Environment	3	2	-	50	100	3	4
PO010 802	Rubber Products - Design &Testing	2	2	-	50	100	3	4
PO010 803	Speciality Polymers	2	2	-	50	100	3	4
PO010 804 L	Elective III	2	2	-	50	100	3	4
PO010 805 G	Elective IV	2	2	-	50	100	3	4
PO010 806	Polymer Blends & Composites Lab	-	-	3	50	100	3	2
PO010 807	Project	-	-	6	100	-	-	4
PO010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

PO 010 804L01… Adhesive Technology
PO 010 804L02 …Dynamics of Machinery
PO 010 804L03 …Computer Aided Design & Manufacturing
PO 010 804L04 …Combustion
PO 010 804L05 …Industrial Hydraulics
PO 010 804L06… Cryogenics

Electives IV

PO 010 805G01…… Fibre Technology
PO 010 805G02…… Marketing & Sales Management
PO 010 805G03… Structural Analysis
PO 010 805G04…… Environmental Impact Analysis
PO 010 805G05…… Air Pollution Control
PO 010 805G06…… Nanotechnology

Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010
Automobile Engineering
Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
AU010 303	Fluid Mechanics and Hydraulic Machinery	2	2	-	50	100	3	4
AU010 304(ME)	Metallurgy & Material Science	3	1	-	50	100	3	4
AU010 305(ME)	Programming in C	3	1	-	50	100	3	4
AU010 306(CE)	Strength of Materials & Structural Engineering	3	1	-	50	100	3	4
AU010 307	*Computer Lab*	-	-	3	50	100	3	2
AU010 308(ME)	*Fluid Mechanics Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
AU010 403	Auto Power Plant	2	2	-	50	100	3	4
AU010 404(ME)	Manufacturing Process	3	1	-	50	100	3	4
AU010 405	Machine Drawing	3	1	-	50	100	3	4
AU010 406(EE)	Electrical Technology	3	1	-	50	100	3	4
AU010 407	*Auto Workshop I*	-	-	3	50	100	3	2
AU010 408(CE)	*Strength of Materials Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	**2**	**2**	-	**50**	**100**	3	4
AU010 502	Computer Aided Design & Manufacturing	**3**	**1**		**50**	**100**	3	4
AU010 503	Auto Chassis	2	2	-	50	100	3	4
AU010 504(ME)	Kinematics of Machinery	3	1	-	50	100	3	4
AU010 505(ME)	I C Engines & Combustion	3	1	-	50	100	3	4
AU010 506(ME)	Thermodynamics	3	1	-	50	100	3	4
AU010 507	*Computer Graphics & Drafting*	-	-	3	50	100	3	2
AU010 508(EE)	*Electrical & Electronics Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AU010 601	Mechanics of Machines	2	2	-	50	100	3	4
AU010 602(ME)	Heat & Mass Transfer	2	2	-	50	100	3	4
AU010 603	Automotive Transmission	3	1	-	50	100	3	4
AU010 604(ME)	Metrology & Machine Tools	3	1	-	50	100	3	4
AU010 605(ME)	Mechatronics & Control Systems	3	1	-	50	100	3	4
AU010 606Lxx	Elective I	2	2	-	50	100	3	4
AU010 607	Heat Engines Lab	-	-	3	50	100	3	2
AU010 608	*Machine Tool Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

AU010 606L01 Vehicle Transport Management
AU010 606L02 Computer Aided vehicle Design
AU010 606L03 Computer Simulation of I C Engines
AU010 606L04 Tribology
AU010 606L05 Alternate Fuels and Energy systems
AU010 606L06 Quantitative Techniques

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AU010 701(ME)	Design of Machine Elements	2	1	1	50	100	3	4
AU010 702	Advanced Automotive Technology	2	2	-	50	100	3	4
AU010 703	Auto Electrical & Electronics	2	1	-	50	100	3	3
AU010 704(ME)	Refrigeration & Air Conditioning	2	1	-	50	100	3	3
AU010 705(ME)	Industrial Engineering	2	1	-	50	100	3	3
AU010 706Lxx	Elective II	2	2	-	50	100	3	4
AU010 707(ME)	Mechanical Measurements Lab	-	-	3	50	100	3	2
AU010 708	*Auto Workshop II*	-	-	3	50	100	3	2
AU010 709	Seminar	-	-	2	50	-	-	2
AU010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**8**	**10**				**28**

Elective II

AU010 706L01 Vehicle Body Engineering
AU010 706L02 Vehicle Performance and Testing
AU010 706L03 Automotive Pollution and Control
AU010 706L04 Project Management
AU010 706L05 Industrial Safety
AU010 706L06 Non Traditional Machining Processes

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AU010 801(ME)	Design of Transmission Elements	2	2	1	50	100	3	4
AU010 802(ME)	Operations Management	2	2	-	50	100	3	4
AU010 803	Special Types of Vehicles	2	2	-	50	100	3	4
AU010 804Lxx	Elective III	2	2	-	50	100	3	4
AU010 805Gxx	Elective IV	2	2	-	50	100	3	4
AU010 806	Auto Workshop III	-	-	3	50	100	3	2
AU010 807	Project	-	-	6	100	-	-	4
AU010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**10**	**10**	**10**				**28**

Electives III

AU010 804L01 Transport Refrigeration and Air Conditioning
AU010 804L02 Engineering Economics and Automotive Cost Estimation
AU010 804L03 Vehicle Dynamics
AU010 804L04 Finite Element Method
AU010 804L05 Microprocessor Application in Automobiles
AU010 804L06 Foundry and Welding Technology

Electives IV

AU010 805G01 System Modeling and Simulation
AU010 805G02 Robotics and Robot Application
AU010 805G03 Farm Machinery and Equipment
AU010 805G04 Aerospace Engineering
AU010 805G05 Management Information systems
AU010 805G06 Petrochemical Engineering

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Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
AN010 303	Fluid Mechanics	2	2	-	50	100	3	4
AN 010 304	Basic Thermodynamics	3	1	-	50	100	3	4
AN 010 305	Elements of Aeronautics	3	1	-	50	100	3	4
AN010 306	Basic Strength of Materials	3	1	-	50	100	3	4
AN 010 307(CE)	*Basic Strength of materials Lab*	-	-	3	50	100	3	2
AN 010 308(ME)	*Fluid Mechanics Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
AN010 402	Gas Dynamics	3	1	-	50	100	3	4
AN 010 403	Propulsion I	2	2	-	50	100	3	4
AN 010 404	Aerodynamics I	3	1	-	50	100	3	4
AN 010 405	Aircraft Structures I	3	1	-	50	100	3	4
AN 010 406	Electrical technology & Machines	3	1	-	50	100	3	4
AN 010 407	*Structures Lab*	-	-	3	50	100	3	2
AN 010 408	*Propulsion Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	2	2	-	50	100	3	4
EN 010 502(ME)	Principles of Management	3	1		50	100	3	4
AN 010 503	Computer Programming	2	2	-	50	100	3	4
AN 010 504	Flight Dynamics I	3	1	-	50	100	3	4
AN 010 505	Aerodynamics II	3	1	-	50	100	3	4
AN 010 506	Propulsion II	3	1	-	50	100	3	4
AN 010 507	*Wind tunnel Lab*	-	-	3	50	100	3	2
AN 010 508	*Propulsion LabII*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AN 010 601	Avionics	2	2	-	50	100	3	4
AN 010 602	Experimental Aerodynamics	2	2	-	50	100	3	4
AN 010 603	Aircraft Structures II	3	1	-	50	100	3	4
AN 010 604	Heat Transfer	3	1	-	50	100	3	4
AN 010 605	Theory of Vibration	3	1	-	50	100	3	4
AN 010 606Lxx	Elective I	2	2	-	50	100	3	4
AN 010 607	*Heat Engines Lab*	-	-	3	50	100	3	2
AN 010 608	*Aero EnginesLab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

AN 010 606L01 Composite structures
AN 010 606L02 Fatigue and fracture
AN 010 606L03 Finite Elément Analysis
AN 010 606L04 Operation Research
AN 010 606L05 Ecology & Environment
AN 010 606L06 Non Destructive Testing

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AN 010 701	Computational Fluid Dynamics	2	2	-	50	100	3	4
AN 010 702	Experimental stress analysis	2	2	-	50	100	3	4
AN 010 703	Aircraft design	2	1	-	50	100	3	3
AN 010 704	Flight dynamics II	2	1	-	50	100	3	3
AN 010 705	Aircraft systems and instrumentation	2	1	-	50	100	3	3
AN 010 706Lxx	Elective II	2	2	-	50	100	3	4
AN 010 707	*Experimental stress analysis Lab*	-	-	3	50	100	3	2
AN 010 708	*Vibration Lab*	-	-	3	50	100	3	2
AN 010 709	Seminar	-	-	2	50	-	-	2
AN 010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

AN 010 706L01Theory of plates and shells
AN 010 706L02 Advanced Materials in aircraft manufacturing
AN 010 706L03 Failure analysis
AN 010 706L04 Helicopter Aerodynamics
AN 010 706L05 Optimization methods in Design
AN 010 706L06 Rotor Dynamics

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
AN 010 801	Rockets & Missiles	3	2	-	50	100	3	4
AN 010 802	Introduction to space technology	2	2	-	50	100	3	4
AN 010 803	Air transportation & Aircraft maintenance	2	2	-	50	100	3	4
AN 010 804Lxx	Elective III	2	2	-	50	100	3	4
AN 010 805Gxx	Elective IV	2	2	-	50	100	3	4
AN 010 806	Aerodynamics Lab	-	-	3	50	100	3	2
AN 010 807	Project	-	-	6	100	-	-	4
AN 010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

AN 010 804L01 Project management & TQM
AN 010 804L02 Air navigation
AN 010 804L03 Aircraft rules & regulations
AN 010 804L04 Industrial aerodynamics
AN 010 804L05 Acoustics & Noise control
AN 010 804L06 Transport process in reacting flows

Electives IV

AN 010 805G01 Boundary layer theory
AN 010 805G02 Disaster Management
AN 010 805G03 Cryogenics
AN 010 805G04 Advanced strength of materials
AN 010 805G05 High temperature gas dynamics
AN 010 805G06 Turbo Machines

Mahatma Gandhi University Revised Scheme For
B Tech Syllabus Revision 2010 (Production Engineering)
Common for All Branches
SCHEME S1&S2

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	-	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

3rd Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 301A	Engineering Mathematics II	2	2	-	50	100	3	4
EN010 302	Economics and Communication Skills	2	2	-	50	100	3	4 (3+1)
PE010 303	Fluid Mechanics	2	2	-	50	100	3	4
PE 010 304	Metallurgy & Material Science	3	1	-	50	100	3	4
PE 010 305	Programming in C	3	1	-	50	100	3	4
PE 010 306(CE)	Strength of Materials & Structural Engineering	3	1	-	50	100	3	4
PE 010 307	*Strength of Materials Lab*	-	-	3	50	100	3	2
PE 010 308	*Fluid Mechanics Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

4th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 401	Engineering Mathematics III	2	2	-	50	100	3	4
EN010 402(ME)	Principles of Management	3	1	-	50	100	3	4
PE 010 403	Hydraulic Machines	2	2	-	50	100	3	4
PE 010 404	Manufacturing Process	3	1	-	50	100	3	4
PE 010 405	Machine Drawing			4	50	100	3	4
PE 010 406(EE)	Electrical Technology	3	1	-	50	100	3	4
PE 010 407	*Hydraulic Machines Lab*	-	-	3	50	100	3	2
PE 010 408	*Computer Programming Lab*	-	-	3	50	100	3	2
	Total	**16**	**8**	**6**				**28**

5th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 501A	Engineering Mathematics IV	2	2	-	**50**	**100**	3	4
PE 010 502	Theory of Metal Cutting	2	2	-	**50**	**100**	3	4
PE 010 503	Advanced Mechanics of Materials	2	2	-	50	100	3	4
PE 010 504	Industrial Engineering	3	1	-	50	100	3	4
PE 010 505	Metrology &Instrumentation	3	1	-	50	100	3	4
PE 010 506	Thermodynamics	3	1	-	50	100	3	4
PE 010 507	*Thermal Engineering Lab*	-	-	3	50	100	3	2
PE 010 508	*Electrical & Electronics Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

6th Semester

Code	Subject	Hours/week			Marks		End-sem duration hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
PE 010 601	Kinematics of Machinery	2	2	-	50	100	3	4
PE 010 602	Heat & Mass Transfer	2	2	-	50	100	3	4
PE 010 603	Control & Automation	3	1	-	50	100	3	4
PE 010 604	Computer Aided Design & Manufacturing	3	1		50	100	3	4
PE 010 605	Production Engineering	3	1	-	50	100	3	4
PE 010 606Lxx	Elective I	2	2	-	50	100	3	4
PE 010 607	*Metrology Lab*	-	-	3	50	100	3	2
PE 010 608	*Machine Tools Lab*	-	-	3	50	100	3	2
	Total	**15**	**9**	**6**				**28**

Elective I

PE 010 606L01 Computational Fluid Dynamics
PE 010 606L02 Foundry and Welding Technology
PE 010 606L03 Finite Elément Analysis
PE 010 606L04 Financial Management
PE 010 606L05 Industrial Hydraulics
PE 010 606L06 Micro Electro Mechanical Systems (MEMS)

7th Semester

Code	Subject	Hours/week			Marks		End-sem duration -hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
PE 010 701	Tool Engineering & Design	2	2	-	50	100	3	4
PE 010 702	Operations Management	2	2	-	50	100	3	4
PE 010 703	Bulk Deformation Processes	2	1	-	50	100	3	3
PE 010 704	Theory of Metal Forming	2	1	-	50	100	3	3
PE 010 705	Advanced Manufacturing Process	2	1	-	50	100	3	3
PE 010 706Lxx	Elective II	2	2	-	50	100	3	4
PE 010 707	*Metallurgy Lab*	-	-	3	50	100	3	2
PE 010 708	*CAD/CAM Lab*	-	-	3	50	100	3	2
PE 010 709	Seminar	-	-	2	50	-	-	2
PE 010 710	*Project*	-	-	1	50	-	-	1
	Total	**12**	**9**	**9**				**28**

Elective II

PE010 706L01 Design of Cellular Manufacturing
PE010 706L02 Industrial Tribology
PE010 706L03 Lean and Agile Manufacturing
PE010 706L04 Supply Chain Management
PE010 706L05 Plant Engineering & Maintenance
PE010 706L06 Rapid Prototyping

8th Semester

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
PE010 801	Composite Matérials & Manufacturing	3	2	-	50	100	3	4
PE010 802	Non Conventional Machining Processes	2	2	-	50	100	3	4
PE010 803	Machine Design	2	2	-	50	100	3	4
PE010 804Lxx	Elective III	2	2	-	50	100	3	4
PE010 805Gxx	Elective IV	2	2	-	50	100	3	4
PE010 806	*Production Process Laboratory*	-	-	3	50	100	3	2
PE010 807	Project	-	-	6	100	-	-	4
PE010 808	Viva Voce	-	-	-	-	50	-	2
	Total	**11**	**10**	**9**				**28**

Electives III

PE010 804L01 Surface Engineering
PE010 804L02 Advanced Machining Process
PE010 804L03 Cost Estimation and Optimization
PE010 804L04 Management Information Systems
PE010 804L05 Non Destructive Testing
PE010 804L06 Simulation of Manufacturing Systems

Electives IV

PE010 805G01 Industrial Safety
PE010 805G02 Disaster Management
PE010 805G03 Nano Technology
PE010 805G04 Human Resources Management
PE010 805G05 Optimization methods in design
PE010 805G06 Reliability engineering

EN010 101 ENGINEERING MATHEMATICS – I

Teaching Scheme **Credits: 5**

2 hour lecture and 1 hour tutorial per week

Objectives

- *To impart mathematical background for studying engineering subjects.*

MODULE I (18 hours) - MATRIX

Elementary transformation – echelon form – rank using elementary transformation by reducing in to echelon form – solution of linear homogeneous and non – homogeneous equations using elementary transformation. Linear dependence and independence of vectors – eigen values and eigen vectors – properties of eigen values and eigen vectors(proof not expected) – Linear transformation – Orthogonal transformation – Diagonalisation – Reduction of quadratic form into sum of squares using orthogonal transformation – Rank, index, signature of quadratic form – nature of quadratic form

MODULE 2 (18 hours) - PARTIAL DIFFERENTIATION

Partial differentiation : chain rules – statement of Eulers theorem for homogeneous functions – Jacobian –Application of Taylors series for function of two variables – maxima and minima of function of two variables (proof of results not expected)

MODULE 3 (18 hours) - MULTIPLE INTEGRALS

Double integrals in cartesian and polar co-ordinates – change of order of integration-area using double integrals – change of variables using Jacobian – triple integrals in cartesian, cylindrical and spherical co-ordinates – volume using triple integrals – change of variables using Jacobian – simple problems.

MODULE 4 (18 hours) - ORDINARY DIFFERENTIAL EQUATIONS

Linear differential equation with constant coefficients- complimentary function and particular integral – Finding particular integral using method of variation of parameters – Euler Cauchy equations- Legenders equations

MODULE 5 (18 hours) - LAPLACE TRANSFORMS

Laplace Transforms – shifting theorem –differentiation and integration of transform – Laplace transforms of derivatives and integrals – inverse transform – application of convolution property – Laplace transform of unit step function – second shifting theorem(proof not expected) – Laplace transform of unit impulse function and periodic function – solution of linear differential equation with constant coefficients using Laplace Transform.

REFERENCES

1. Erwin Kreyszig ;Advanced Engineering Mathematics Wiley Eastern Ltd
2. Grewal B.S ;Higher Engineering Mathematics ,Khanna Publishers
3. N. P. Bali ;Engineering Mathematics ,Laxmi Publications Ltd
4. Goyal & Gupta ; Laplace and Fourier Transforms
5. Dr. M.K.Venkataraman ;Engineering Mathematics Vol. I,National Publishing Co.
6. Dr. M.K.Venkataraman Engineering Mathematics Vol. 2, National Publishing Co
7. T.Veerarajan ,Engineering Mathematics for first year, Mc Graw Hill
8. S.S.Sastry Engineering Mathematics Vol. I,Prentice Hall India
9. S.S.Sastry Engineering Mathematics Vol. 2, Prentice Hall India
10. B.V. Ramana Higher Engineering Mathematics, Mc Graw Hill

EN010 102 ENGINEERING PHYSICS

Teaching Scheme **Credits: 4**

I hour lecture and 1 hour tutorial per week

Objectives

- *To provide students knowledge of physics of a problem and an overview of physical phenomena.*

MODULE I (12 hours) LASERS AND HOLOGRAPHY

Lasers- Principle of laser- Absorption- Spontaneous emission- Stimulated emission- Characteristics of laser - Population inversion- Metastable states- Pumping- Pumping Methods- Pumping Schemes- 3 level and 4 level pumping- Optical resonator- Components of laser- Typical laser systems like Ruby laser- He-Ne laser- Semiconductor laser- Applications of laser-

Holography- Basic principle -Recording and reconstruction- comparison with ordinary photography-Applications of Hologram

MODULE II (12 hours) NANOTECHNOLOGY AND SUPERCONDUCTIVITY

Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle, nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C_{60}, metallic nanocomposites and polymer nanocomposites- Applications of nanotechnology

B. Superconductivity- Introduction- Properties of super conductors- Zero electrical resistance- Critical temperature- Critical current- Critical magnetic field- Meissner effect- Isotope effect- Persistence of current- Flux quantization - Type I and Type II superconductors- BCS Theory (Qualitative study) – Josephson effect- D.C Josephson effect- A.C Joseph son effect- Applications of superconductors.

MODULE III (12 hours) CRYSTALLOGRAPHY AND MODERN ENGINEERING MATERIALS

A. Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems- Bravais lattices- Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius- Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg's law- Bragg's x-ray spectrometer- Crystal structure analysis.

Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical, magnetic and chemical properties)

Shape memory alloys- Shape memory effect, pseudo elasticity

.

MODULE IV (12 hours) ULTRASONICS

A. Ultrasonics- Production of ultrasonics- Magnetostriction method – Piezoelectric method- Properties of ultrasonics- Non destructive testing- Applications

B. Spectroscopy- Rayleigh scattering (Qualitative) - Raman effect – Quantum theory of Raman effect- Experimental study of Raman effect and Raman spectrum- Applications of Raman effect

C. Acoustics- Reverberation- Reverbaration time- Absorption of sound- Sabine's formula(no derivation)- Factors affecting acoustics properties

MODULE V (12 hours) FIBRE OPTICS

Principle and propagation of light in optical fibre- Step index (Single Mode and Multi Mode fibre) and graded index fibre- N.A. and acceptance angle—Characteristics of optical fibres (Pulse dispersion, attenuation, V-number, Bandwidth-distance product) –

Applications of optical fibres- Fibre optic communication system (Block diagram)- Optical fibre sensors (any five) – Optical fibre bundle.

REFERENCES

1) A Text book of Engineering Physics – M.N.Avadhanulu and P.G.Kshirsagar S.Chand& Company Ltd.
2) Nanomaterials- A.K.Bandhopadyaya – New Age International Publishers
3) Engineering Physics – A. Marikani
4) Engineering materials –V Rajendran and Marikani-Tata McGraw-Hill Publishing Company Limited
5) Engineering physics- Dr. M Arumugam - Anuradha Agencies
6) Nano ; The Essentials- T. Pradeep
7) Material Science-M Arumugham- Anuradha Agencies
8) Lasers and Non-Linear optics By B.B Laud- New Age International (P) Limited

EN010 103 Engineering Chemistry & Environmental Studies

(Common to all branches)

Teaching scheme **Credits:4**

1hr lecture and 1hr tutorial per week (total 60 hrs)

Objectives

- *To impart a scientific approach and to familiarize the applications of chemistry in the field of technology*
- *To create an awareness about the major environmental issues for a sustainable development.*

Module 1 Electrochemical Energy Systems (13 hrs)

Electrochemical cells - Galvanic cell - Daniel cell – EMF - determination by potentiometric method - Nernst equation – derivation- Single electrode potential-Types of electrodes- Metal/metal ion electrode, Metal/metal sparingly soluble salt electrode, Gas electrode and Oxidation/reduction electrode - Reference electrodes - Standard hydrogen electrode and Calomel electrode - Glass electrode – Determination of pH using these electrodes - Concentration cell – Electrolytic concentration cell without transfer - Derivation of EMF using Nernst equation for concentration cell - Cells and Batteries - Primary and secondary cells - Lead acid accumulator, Ni-Cd cell, Lithium–MnO_2 cell and Rechargeable Lithium ion cell – Polarization – Overvoltage - Decomposition potential - Numerical problems based on Nernst equations and pH determination.

Module 2 Corrosion and Corrosion Control (10 hrs)

Introduction - Types of corrosion – Chemical and Electrochemical corrosion – Chemical corrosion – Oxidation corrosion, By other gases and Liquid metal corrosion – Pilling-Bedworth rule - Electrochemical corrosion – Mechanism - absorption of O_2 and evolution of H_2 - Types of electrochemical corrosion- Galvanic corrosion, Concentration cell corrosion, Differential aeration corrosion, Pitting corrosion, Waterline corrosion and Stress corrosion - Factors influencing the rate of corrosion - Nature of the metal and Nature of the environment - Corrosion control methods – Selection of metal and proper design, Cathodic protection (Sacrificial anodic protection and Impressed current cathodic protection), Modifying the environment, corrosion inhibitors and Protective coating - Metallic coating – Anodic coating and cathodic coating - Hot dipping (Galvanizing and Tinning), Electroplating, Electroless plating, Metal spraying, Metal cladding Cementation- sheradizing - chromizing- calorizing and Vacuum metallization - Non-metallic coating - Anodization

Module 3 Engineering Materials (13 hrs)

High polymers – Introduction - Degree of polymerization – Functionality – Tacticity - Types of polymerization (mechanisms not required) – Addition, Condensation and Copolymerization - Glass transition temperature-(Tg) Definition only, Compounding and moulding of plastics - Compression, Injection, Extrusion, Transfer and Blow moulding.

Fiber Reinforced Plastics - Glass reinforced plastics (GRP) - Manufacturing methods - Hand lay up, Spray up and Filament winding - properties and uses.

Conducting Polymers – Polyacetylene and Polyaniline - Applications (mechanism not required)

Rubber - Natural rubber – Properties – Vulcanization - Synthetic rubber - Preparation, properties and uses of Polyurethane rubber, NBR and Silicone rubber.

Carbon Nanotubes - Single walled (SWCNT) and Multi walled (MWCNT) - Properties and uses.

Module 4 Environmental Pollution (12 hrs)

Pollution - Types of pollution – a brief study of the various types of pollution - Air pollution - Sources and effects of major air pollutants – Gases - Oxides of carbon, nitrogen and sulphur – Hydrocarbons – Particulates -Control of air pollution - Different methods - Water pollution - Sources and effects of major pollutants - Inorganic pollutants- heavy metals cadmium , lead, mercury - Ammonia, Fertilizers and Sediments (silt) - Organic pollutants – Detergents, pesticides, food waste, - Radioactive materials - Thermal pollutants - Control of water pollution - General methods

Eutrophication - Definition and harmful effects

Desalination of water - Reverse osmosis and Electrodialysis

Module 5 Environmental Issues (12 hrs)

An overview of the major environmental issues - Acid rain – Smog - Photochemical smog - Green house effect - Global warming and climate change - Ozone layer depletion – Deforestation - Causes and effects - Wet land depletion – Consequences, Biodiversity – importance and threats, Soil erosion - Causes and effects, Solid waste disposal -Methods of disposal - Composting, Landfill, and Incineration, E-Waste disposal - Methods of disposal – recycle(recovery) and reuse

Renewable energy sources - Solar cells – Importance - Photo voltaic cell - a brief introduction

Bio fuels - Bio diesel and Power alcohol.

Note: This course should be handled and examination scripts should be evaluated by the faculty members of Chemistry

Text Books

1. A text book of Engineering Chemistry - Shashi Chawla, Dhanpat Rai and Co.
2. A text book of Engineering Chemistry - Jain & Jain 15th edition .
3. A text book of Engineering Chemistry – S. S. Dhara.
4. Modern Engineering Chemistry – Dr. Kochu Baby Manjooran. S.

References

1. Chemistry - John E. McMurry and Robert C. Fay, Pearson Education.
2. Polymer science –V. R. Gowariker, New Age International Ltd.
3. A text book of polymer - M. S. Bhatnagar Vol I, II,& III, S. Chand publications.
4. Nano materials – B. Viswanathan, Narosa publications.
5. Nano science & Technology – V. S. Muralidharan and A. Subramania, Ane Books Pvt. Ltd.
6. Nanotechnology - Er. Rakesh Rathi, S. Chand & Company Ltd.
7. Environmental Studies - Benny Joseph (2nd edition), Tata Mc Graw Hill companies.
8. Environmental Chemistry - Dr. B. K. Sharma, Goel publishers.
9. Environmental Chemistry – A. K. De, New age International Ltd.
10. Industrial Chemistry – B. K. Sharma, Goel publishers.
11. Engineering Chemistry – O. G. Palanna, Tata Mc Graw Hill Education Pvt. Ltd.

EN010 104 ENGINEERING MECHANICS

(Common to all branches)

Teaching Scheme **Credits: 6**

3 hour lecture and 1 hour tutorial per week

Objective:

- *To develop analytical skills to formulate and solve engineering problems.*

Module I (23 hrs)

Introduction to Mechanics – Basic Dimensions and Units – Idealization of Mechanics – Rigid Body – Continuum – Point force – Particle – Vector and Scalar quantities.

Principles of Statics – Force Systems – Coplanar, Collinear, Concurrent and Parallel – Free body diagrams – Resolution of forces – Moment of a Force – Varignon's Theorem – Couple – Resolution of a force into force couple system – Conditions of static equilibrium of Rigid bodies – Solutions of problems using scalar approach

Force Systems in Space – Introduction to Vector approach – Elements of Vector algebra – Position vector – Moment of a Force about a Point and Axis – Resultant of Forces – Equilibrium of forces in space using vector approach

Module II (23 hrs)

Principle of Virtual work – Elementary treatment only – application of virtual work in beams, ladders

Centroid of Lines, Areas and Volumes – Pappus Guldinus Theorems

Moment of Inertia of laminas – Transfer theorems – radius of Gyration – problems

Centre of Gravity – Mass moment of Inertia of circular and rectangular plates – solid rectangular prisms – Cylinders – Cones

Module III (23 hrs)

Friction – Laws of friction – Contact friction problems – ladder friction – Wedge friction – Screw friction.

Introduction to Structural Mechanics – Types of Supports, loads, frames – Static Indeterminacy – Support reactions of beams – Analysis of perfect trusses by method of joints, method of sections.

Module IV (28hrs)

Kinematics – Rectilinear motion of a particle under Variable Acceleration

Relative Velocity - problems

Circular motion with Uniform and Variable Acceleration – Relations between Angular and Rectilinear motion – Normal and Tangential accelerations

Combined motion of Rotation and Translation – Instantaneous centre of zero velocity – Wheels rolling without slipping

Introduction to Mechanical Vibrations – Free vibrations – Simple Harmonic motion

Module IV (23 hrs)

Kinetics of particles – Newton's laws of Motion of Translation – D'Alembert's Principle – Motion of connected bodies – Work Energy Principle – Principle of Momentum and Impulse – Collision of Elastic bodies

Newton's laws of Rotational motion – Angular Impulse and Torque – Conservation of Angular Momentum – Centrifugal and Centripetal forces – Applications – Work done and Power by Torque and Couple.

References:

1. Engineering Mechanics – S. Timoshenko, D.H. Young – Mc Graw Hill International Edition
2. Engineering Mechanics – Statics and Dynamics – Irving H Shames, G Krishna Mohana Rao – Pearson Edutcation
3. S. Rajasekararn & G.Sankarasubramanian, Engineering Mechanics, Vikas Publishing Co.
4. Engineering Mechanics – Prof.J.Benjamin
5. Engineering Mechanics – G.S. Sawheney PHI Learning Pvt.Ltd, New Delhi
6. Engineering Mechanics – K. L. Kumar, Tata Mc Graw Hill, New Delhi

EN010 105: **ENGINEERING GRAPHICS**

Teaching Scheme **Credits: 6**

I hour lecture and 3 hour drawing per week

Objectives

- *To provide students of all branches of engineering with fundamental knowledge of engineering drawing*
- *To impart drawing skills to students*

MODULE 1 (24 hours)

Introduction to Engineering Graphics: Drawing instruments and their uses-familiarization with current BIS code of practice for general engineering drawing.

Scales-Plain scales-Diagonal Scales-Forward and Backward Vernier Scales.

Conic Sections:-Construction of conics when eccentricity and distance from directrix are given .Construction of ellipse (1) given major axis and foci (2) given major axis and minor axis (3)given a pair of conjugate diameters (4) by the four centre method. Construction of parabola given the axis and base. Construction of hyperbola-(1) given the asymptotes and a point on the curve. (2) Given ordinate, abscissa and transverse axis. Construction of rectangular hyperbola. Construction of tangents and normals at points on these curves.

Miscellaneous curves:-Cycloids, Inferior and superior Trochoids-Epicycloid-Hypocycloid-Involute of circle and plain figures-Archimedian Spiral and Logarithmic Spiral- Tangents and normals at points on these curves.

MODULE 2 (24 hours)

Orthographic projections of points and lines:-Projections of points in different quadrants-Projections of straight lines parallel to one plane and inclined to the other plane-straight lines inclined to both the planes-true length and inclination of lines with reference planes using line rotation and plane rotation methods – Traces of lines.

Orthographic projections of planes-Polygonal surfaces and circular lamina.

MODULE 3 (24 hours)

Orthographic projections of solids:-Projections of prisms , cones ,cylinders ,pyramids ,tetrahedron ,octahedron and spheres with axis parallel to one plane and parallel or perpendicular to the other plane-the above solids with their axes parallel to one plane and inclined to the other plane –axis inclined to both the reference planes-use change of position method OR auxiliary method.

Sections of solids:-Sections of prisms ,cones , cylinders ,pyramids ,tetrahedron and octahedron with axis parallel to one plane and parallel or perpendicular or inclined to the other plane with section planes perpendicular to one plane and parallel , perpendicular or inclined to the other plane –True shapes of sections.

MODULE 4 (24 hours)

Developments of surfaces of (1)simple solids like prisms ,pyramids , cylinder and cone (2) sectioned regular solids (3)above solids with circular or square holes with their axes intersecting at right angles.-Developments of funnels and pipe elbows.

Isometric Projections:-Isometric Scales-Isometric views and projections of plane figures,simple&truncated solids such as prisms, pyramids, cylinder, cone, sphere, hemisphere and their combinations with axis parallel to one the planes and parallel or perpendicular to the other plane.

MODULE 5 (24 hours)

Perspective projections:-Perspective projections of prisms,pyramids,cylinder and cone with axis parallel to one plane and parallel or perpendicular or inclined to the other plane by visual ray method OR vanishing point method

Intersection of surfaces:-Intersection of prism in prism &cylinder in cylinder-Axis at right angles only.

REFERENCES

1. Engineering Graphics-Unique Methods easy solutions-K.N Anilkumar
2. Engineering Graphics-P I Varghese.
3. Engineering Drawing-N D Bhatt
4. Engineering Graphics-P S Gill
5. Engineering Graphics-T S Jeyapoovan.

EN010 106: BASIC CIVIL ENGINEERING

(Common to all branches)

Teaching scheme: **Credits: 4**

1 hour lecture and 1 hour tutorial per week

Objective:

To familiarize all engineering students with the basic concepts of civil engineering so that they can perform better in this great profession "Engineering".

Module 1 (12 hours)

Introduction to civil engineering : various fields of civil engineering- Engineering materials: Cement – Bogues compounds, manufacture of Portland cement-wet and dry process, grades of cement, types of cement and its uses – steel– types of steel for reinforcement bars ,structural steel sections,built-up sections,light gauge sections. Aggregates: Fine aggregate:- pitsand, riversand, M- sand--Coarse aggregate: natural and artificial , requirements of good aggregates. Timber: varieties found in Kerala – seasoning and preservation. Bricks**:** classification, requirements, tests on bricks.

Module 2 (12 hours)

Cement mortar- preparation and its uses– concrete –ingredients, grades of concrete – water cement ratio, workability, curing, ready mix concrete. Roofs - roofing materials -A. C, aluminium, GI, fibre, tile, reinforced concrete (brief description only)- reinforcement details of a one way slab, two way slab and simply supported beams.

Module 3 (12 hours)

Building Components: Foundation: Bearing capacity and settlement - definitions only- footings- isolated footing , combined footing - rafts, piles and well foundation , machine foundation (Brief description only).

Superstructure: Walls - brick masonry – types of bonds , English bond for one brick - stone masonry-Random Rubble masonry.

Module 4 (12 hours)

Surveying**:** Classification –principles of surveying- chain triangulation- instruments used, field work – bearing of survey lines –WCB and reduced bearing -Leveling: field work - reduction of levels - height of instrument method.

Introduction to total station- basic principles of remote sensing, GPS and GIS.

Module 5 (12 hours)

Site plan preparation for buildings (Sketch only) – Kerala Municipal Building Rules (1999)-general provisions regarding site and building requirements – coverage and floor area ratio – basic concepts of "intelligent buildings" and "green buildings"- disposal of domestic waste water through septic tank and soak pit. Classification of roads- basics of traffic engineering – road markings , signs, signals and islands, road safety-accidents, causes and remedies– (brief description only)

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Tests (minimum 2)
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
20% - Regularity in the class

References

1. Jha and Sinha, Construction and foundation Engineering, Khanna Publishers
2. Punmia B. C., Surveying Vol –I, Laxmi Publications
3. Rangwala, Building Materials, Charotar Book stall
4. K. Khanna ,C. E. G. Justo., Highway Engineering, Khanna Publishers
5. Nevile., Properties of Concrete, Mc Graw Hill
6. B C Punmia.,Basic Civil Engineering, Khanna Publishers
7. Kerala Municipal Building Rules – 1999

EN010 107 BASIC MECHANICAL ENGINEERING

(Common to all branches)

Teaching scheme **Credits- 4**

1hour lecture and1hour tutorial per week

Objective

To impart basic knowledge in mechanical engineering

Module 1(12 hours)

Thermodynamics: Basic concepts and definitions, Gas laws, specific heat –Universal gas constant- Isothermal, adiabatic and polytrophic processes, work done, heat transferred, internal energy and entropy - Cycles: Carnot, Otto and Diesel- Air standard efficiency.
Basic laws of heat transfer (Fourier's law of heat conduction, Newton's law of cooling Steffen Boltzmann's law)

Module 2 (12 hours)

I.C. Engines: Classification of I.C Engines, Different parts of I.C engines, Working of two stroke and four stroke engines-petrol and diesel engines-air intake system, exhaust system, fuel supply system, ignition system, lubrication system, cooling system and engine starting system-Performance of I.C. engines, advantage of MPFI and CRDI over conventional system.
Refrigeration: Unit of refrigeration, COP, Block diagram and general descriptions of air refrigeration system, vapour compression and vapour absorption systems- Required properties of a refrigerant, important refrigerants– Domestic refrigerator- Ice plant.
Air conditioning system: Concept of Air conditioning, psychometry, psychometric properties, psychometric chart, psychometric processes, human comfort– winter and summer air conditioning systems (general description), air conditioning application.

Module 3 (12 hours)

Power transmission elements: Belt Drive - velocity ratio of belt drive, length of belt, slip in belt- simple problems– Power transmitted– Ratio of tensions– Centrifugal tension Initial tension– Rope drive, chain drive and gear drive-Types of gear trains (simple descriptions only)

Module 4 (12 hours)

Power plants: General layout of hydraulic, diesel, thermal and nuclear power plants-nonconventional energy sources (general description only).
Hydraulic turbines and pumps : Classifications of hydraulic turbines –types of hydraulic turbines –runaway speed, specific speed, draft tube, cavitations, selection of hydraulic turbines .Classification of pumps– positive displacement and rotodynamic pumps (description only)- applications
Steam turbines: Classification of steam turbines, description of common types of steam turbines: Impulse and reaction, compounding methods.

Module 5 (12 hours)

Simple description of general purpose machines like lathe, shaping machines, drilling machines, grinding machines and milling machines, Basic concepts of CNC, DNC, CIM and CAD/CAM
Manufacturing Processes: Moulding and casting, forging, rolling, welding- arc welding-gas welding (fundamentals and simple descriptions only)

Internal continues assessment (Maximum Marks –50)

60% Test (minimum2)
20% Assignments (minimum 2) such as home work, quiz, seminar.
20% regulatory in class

Text book

1 P.L. Bellany, *Thermal Engineering,* Khnna Publishes
2 Benjamin J., *Basic Mechanical Engineering*, Pentx

Reference Books

1 R.C.Patal, *Elements of heat engines,* Acharya Publishers -
2 G.R Nagapal, *Power plant engineering,* Khnna publishes
3 P.K.Nag, *Engineering Thermodynamics*, McGraw Hill
4 Dr.P.R Modi &Dr.M.S. Seth, *Hydraulics & Fluid Mechanics including Hydraulic Machines,* Standard Book House

EN010 108: Basic Electrical Engineering

(Common to all branches)

Teaching Scheme **Credits: 4**

I hour lecture and 1 hour tutorial per week

Objectives

- *To provide students of all branches of engineering with an overview of all the fields of electrical engineering*
- *To prepare students for learning advanced topics in electrical engineering*

Module I (10 hours)

Kirchhoff's Laws – Formation of network equations by mesh current method – Matrix representation – Solution of network equations by matrix method – Star delta conversion.

Magnetic circuits – mmf, field strength, flux density, reluctance, permeability – comparison of electric and magnetic circuits – force on current carrying conductor in magnetic filed.

Module II (12 hours)

Electromagnetic Induction – Faraday's laws – lenz's law – statically and dynamically induced emf – self and mutual inductance – coupling coefficient.

Alternating current fundamentals – generation of AC –frequency, period, average and r m s value, form factor, peak factor, phasor representation – j operator – power and power factor – solution of RLC series and parallel circuits.

Module III (13 hours)

DC machine – principle of operation of DC generator – constructional details – e m f equation – types of generators.

DC motor – principle of operation of DC motor – back emf – need for starter – losses and efficiency – types of motors – applications – simple problems.

Transformer – principle of operation – e m f equation Constructional details of single phase and three phase transformer – losses and efficiency – application of power transformer, distribution transformer, current transformer and potential transformer.

Module IV (13 hours)

Three phase system – generation of three phase voltage – star and delta system – relation between line and phase voltages and currents – phasor representation of three phase system - balanced delta connected system – three wire and four wire system – simple problems. Three phase power measurement – Single wattmeter, two wattmeter and three wattmeter methods.

Induction motors – principle of operation of three phase induction motors – applications of cage and slip ring induction motor – single phase induction motors – capacitor start / run, shaded pole – universal motors - Applications.

Synchronous generator (Alternator) – principles of operation and types.

Module V (12 hours)

Generation of electric power – types of generation – hydroelectric, thermal and nuclear (Block schematic and layout only) - Non conventional energy sources – solar, wind, tidal, wave and geothermal.

Transmission – need for high voltage transmission – Transmission voltage – Distribution – Underground versus overhead – Feeder – Distributor – Service mains – conductor materials – one line diagram of typical power system.

Requirements of good lighting system – working principle of incandescent lamp, Fluorescent lamp and mercury vapour lamp-energy efficient lamps (CFL,LED lights) – need for energy management and power quality – home energy management.

Text Books

1. D.P. Kothari & I.J. Nagrath – Basic Electrical Engineering – Tata McGraw Hill
2. D.C. Kulshreshta – Basic Electrical Engineering - Tata McGraw Hill
3. Hughes – Electrical and Electronic Technology – Pearson Education

Reference Books

1. R.V. Srinivasa Murthy – Basic Electrical Engineering – Sunguine Technical
2. J.B.Gupta – Fundamentals of Electrical Engineering & Electronics – S.K.Kataria
3. V.K. Mehta, Rohit Mehta – Basic Electrical Engineering – S.Chand.
4. Bureau of Engineering Efficiency – Guide book for national certification examination for energy managers and auditors.
5. Rajendra Prasad – Fundamentals of Electrical Engineering, Prentice Hall India.
6. Soni, Gupta, Bhatnagar & Chackrabarty – A text book on power system engineering – Dhanapt Rai
7. Electrical Engineering Fundamentals – Vincent Del Toro, Pearson Education.

EN010 109: Basic Electronics Engineering and Information Technology

(Common to all branches)

Teaching Scheme **Credits: 5**

2 hour lecture and 1 hour tutorial per week

Objectives

- *To provide students of all branches of engineering with an overview of all the fields of electronics engineering and information technology*

MODULE 1 (18 hours): Basic Circuit Components: *Diode:* Germanium, Silicon, Zener, LEDs (working principle only). Forward and reverse characteristics. [2hr.] *Rectifiers*: Half wave, fullwave , Bridge circuits, DC Power supply: Capacitor filter, Zener regulator. [3hrs.] *Transistors* :Different configurations - CE characteristics-β and ∝, concept of Amplifiers: Common emitter RC coupled amplifier, Frequency response, Bandwidth.(No analysis required)

Comparison of BJT,FET,MOSFET, IGBT. [2hr.]. *Integrated circuits*: Advantages, classification of Linear and Digital ICs. Basics of Op-amps, inverting and non-inverting amplifiers.Family of IC's(Function diagram of 7400 & CD4011) [4hrs.] .Specifications of TTL and CMOS.[] –Comparison.

MODULE 2 (18 hours): Basic communication Engineering:*Communication:* Frequency bands: RF, VHF, UHF, x, ku, ka, c. Modulation – need for modulation, basic principles of amplitude, frequency and pulse modulation. [6hrs.]. Block schematic of AM transmitter , Super-hetrodyne receiver, FM receiver.-function of each block.[3hrs.] .*Wireless communication*: *Satellite Communication*-Earth station, transponder and receiver.*Mobile Communication*: GSM-BSC, Cell structure, frequency re-use, hands-of, establishing a call.

MODULE 3 (18 hours):Basic instrumentation and Consumer electronics: *Electronic instrumentation*: Transducers: Basic principles of Strain guage, LVDT, Thermistor, Photodiode, Typical moving coil microphones and Loud speaker.Block diagram of Digital Multimeter .[8hrs*].CONSUMER ELECTRONICS*: Basic principles of TV –Interlaced Scanning-Block Diagram of PAL TV receiver(color).Basic principles of DTH, brief descriptions of MP3,multichannel audio 5.1,7.1.

MODULE 4 (18 hours):**Introduction**: Definition and Scope of IT-Digital Computer, Von Neumann Architecture-Basic Operational Concepts-CPU-single Bus and Multi Bus Organization, A typical Instruction set, Execution of Instructions. **Memory and I/O**-Main Memory, Virtual Memory-Cache memory-Secondary Memories-Printers, Plotters, Displays ,Key board, Mouse, OMR and OCR-Device Interface-I/O Processor-I/O Channel

MODULE 5 (18 hours) :Computer software-System Software and Application Software-Machine Language-Assembly Language-High Level Language-Language Translators-Operating System, Procedural Programming and Object Oriented Programming.**Computer**

Networks-Concepts of Networking-Network Topologies-WAN-LAN-MAN, Protocol-Internet-working concept, Internet Architecture, IP addresses, Routing, Domain Name System(Basic concepts only)

References

1.Basic Electronics – Devices, Circuits and IT fundamentals.Santiram Kal,PHI(Module 1to 5)
2. Basic Electronics: Bernad Grob, Mc Graw Hill Publication(Module 1)
3. Electronic Devices: Floyd, Pearson Education (Module 1)
4. Electronic Devices and Circuits: J.B. Gupta,S.K.Kataria & Sons (Module 1 , 2,3)
5. Digital Principles: Malvino & Leach, Mc Graw Hill Publication(Module 1)
6. Electronic Instrumentation: H.S Kalsi, Mc Graw Hill Publication(Module 2)
7. Communication Systems: Sanjay Sharma, S.K.Kataria & Sons (Module 2)
8. Satellite Comunication : Robert M.Gagliardi,CBS Publishers & Distributors.(Module 2)
9.Basic Radio and TV; S.P. Sharma,Tata McGrawhill(Module 2 &3)
10.Wireless Communication; T.S. Rappaport, Pearson(Module 3)
11.Computer Organization, Hamacher, Vranesic and Zaky, Mc Graw Hill (Module 4)
12.Systems Programming, JJ Donovan ,Mc Graw Hill (Module 5)
13.Computer Networks,Andrew.S Tanenbaum,Pearson Education(Module 5)

EN010 110: Mechanical Workshop

(Common to all branches)

Teaching scheme **Credits: 1**

3 hours practical per week

Objectives

- *To provide students of all branches of engineering in house experience of basic mechanical instruments and activities*

Carpentry Planing – cutting – chiselling, marking – sawing – cross and tee joints – dovetail joints – engineering application, Seasoning, Preservation – Plywood and ply boards.

Fitting Practice in chipping – filing – cutting – male and female joints.

Smithy Forging of square and hexagonal prism. Study of forging principles, materials and operations.

Foundry Preparation of simple sand moulds – moulding sand characteristics, materials, gate, runner, riser, core, chaplets and casting defects.

Demonstration and study of machine tools – lathe, drilling, boring, slotting, shaping, milling and grinding machines, CNC machines and machining centers.

Demonstration and study of arc and gas welding techniques.

Note:

1. *The minimum mark for a pass for EN010 110Mechanical workshop is 25 out of 50 in internal assessments.*
2. *If the student fails in securing minimum mark for pass mentioned above will be considered as failed in the respective workshop.*

The candidate not satisfying the above mentioned condition may be given 'U' grade in the grade card. For the purpose of fixing grade, the marks are hypothetically escalated to 150. Other grades may be given as specified for other subjects.

The failed candidate has to attend the respective workshop classes in the subsequent semesters. The internal assessment will be made by repeating all workshop activities. The student has to register for EN010 110 Mechanical Workshop in the college by paying the fees prescribed by the college.

HOD in charge of workshop will allot a staff member to monitor the activities and awarding the internal marks. The internal marks should be submitted to the university.

EN010 111: Electrical and Civil Workshops

(Common to all branches)

Teaching scheme **Credits: 1**

3 hours practical per 2 weeks for each

Objectives

- *To provide students of all branches of engineering in house experience of basic electrical and civil instruments and activities*

Electrical Workshop

1. Wiring and estimation of one lamp and one plug, Control of two lamps in series and in parallel.
2. Staircase wiring.
3. Godown wiring.
4. Insulation megger - earth megger , measurement of insulation resistance and earth resistance .Study of volt meter, ammeter , watt meter and energy meter.
5. Working principle and wiring of Fluorescent , CFL and Mercury vapour lamp .
6. Study and wiring of distribution board including power plug using isolator, MCB and ELCB – Estimation of a typical 1BHK house wiring system.
7. Familiarization , soldering, testing and observing the wave forms on a CRO of a HW and FW Uncontrolled Rectifier (using diodes) with capacitor filter.
8. Observing the wave forms on a CRO of Experiment 7 without capacitor filter and find the average and RMS value of the voltage waveform.
9. Visit your college substation and familiarize the supply system, Transformer, HT Panel and Distribution etc.

Civil Workshop

Masonry : English bond – Flemish bond – wall junction – one brick – one and a half brick – two brick and two and a half brick – Arch setting.

Plumbing: Study of water supply and sanitary fittings – water supply pipe fitting – tap connections – sanitary fittings – urinal, wash basin – closet (European and Indian), Manholes.

Surveying: Study of surveying instruments – chain – compass – plane table – levelling – minor instruments. Demonstration of Theodolite and Total Station.

Familiarization of latest building materials : Flooring materials – Roofing materials – Paneling boards.

Note:

1. *The minimum mark for a pass for EN010 111 Electrical and Civil workshop is 50 out of 100 in internal assessments.*
2. *If the student fails in securing minimum mark for pass mentioned above will be considered as failed in the respective workshop.*

The candidate not satisfying the above mentioned condition may be given 'U' grade in the grade card. For the purpose of fixing grade, the marks are hypothetically escalated to 150. Other grades may be given as specified for other subjects.

The failed candidate has to attend the respective workshop classes in the subsequent semesters. The internal assessment will be made by repeating all workshop activities. The student has to register for EN010 111 Electrical and Civil Workshop in the college by paying the fees prescribed by the college.

HOD in charge of workshop will allot a staff member to monitor the activities and awarding the internal marks. The internal marks should be submitted to the university.

Civil Engineering (CE)

EN010301A ENGINEERING MATHEMATICS II
(Common to all branches except CS & IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives

- *To apply standard methods and basic numerical techniques for solving problems and to know the importance of learning theories in Mathematics.*

MODULE 1 Vector differential calculus (12 hours)

Scalar and vector fields – gradient-physical meaning- directional derivative-divergence an curl - physical meaning-scalar potential conservative field- identities - simple problems

MODULE 2 Vector integral calculus (12 hours)

Line integral - work done by a force along a path-surface and volume integral-application of Greens theorem, Stokes theorem and Gauss divergence theorem

MODULE 3 Finite differences (12 hours)

Finite difference operators Δ, ∇, E, μ and δ - interpolation using Newtons forward and backward formula – problems using Stirlings formula, Lagrange's formula and Newton's divided difference formula

MODULE 4 Difference Calculus (12 hours)

Numerical differentiation using Newtons forward and backward formula – Numerical integration – Newton's – cotes formula – Trapezoidal rule – Simpsons $1/3^{rd}$ and $3/8^{th}$ rule – Difference equations – solution of difference equation

MODULE 5 **Z** transforms (12 hours)

Definition of Z transforms – transform of polynomial function and trignometric functions – shifting property , convolution property - inverse transformation – solution of 1^{st} and 2^{nd} order difference equations with constant coifficients using Z transforms.

Reference

1. Erwin Kreyszing – Advance Engg. Mathematics – Wiley Eastern Ltd.
2. B.S. Grewal – Higher Engg. Mathematics - Khanna Publishers
3. B.V. Ramana - Higher Engg. Mathematics – McGraw Hill
4. K Venkataraman- Numerical methods in science and Engg -National publishing co
5. S.S Sastry - Introductory methods of Numerical Analysis -PHI
6. T.Veerarajan and T.Ramachandran- Numerical Methods- McGraw Hill
7. Babu Ram – Engg. Mathematics -Pearson.
8. H.C.Taneja Advanced Engg. Mathematics Vol I – I.K.International

EN010 302 Economics and Communication Skills

(Common to all branches)

Teaching scheme
2hours lecture and 2 hours tutorial per week **Credits: 4(3+1)**
Objectives

- To impart a sound knowledge of the fundamentals of Economics.

Economics

Module I (7 hours)
Reserve Bank of India-functions-credit control-quantitative and qualitative techniques
Commercial banks-functions- Role of Small Industries Development Bank of India and National Bank for Agriculture and Rural Development
The stock market-functions-problems faced by the stock market in India-mutual funds

Module II (6 hours)
Multinational corporations in India-impact of MNC's in the Indian economy
Globalisation-necessity-consequences
Privatisation-reasons-disinvestment of public sector undertakings
The information technology industry in India-future prospects
Module III (6 hours)
Direct and indirect taxes- impact and incidence- merits of direct and indirect taxes-progressive and regressive taxes-canons of taxation-functions of tax system-
tax evasion-reasons for tax evasion in India-consequences-steps to control tax evasion
Deficit financing-role-problems associated with deficit financing

Module IV (5 hours)
National income-concepts-GNP, NNP, NI, PI and DPI-methods of estimating national income-difficulties in estimating national income
Inflation-demand pull and cost push-effects of inflation-government measures to control inflation

Module V (6 hours)
International trade-case for free trade-case for protectionism
Balance of payments-causes of disequilibrium in India's BOP-General Agreement on Tariffs and Trade-effect of TRIPS and TRIMS in the Indian economy-impact of WTO decisions on Indian industry

Text Books

1. Ruddar Datt, Indian Economy, S.Chand and Company Ltd.
2. K.K.Dewett, Modern Economic Theory, S.Chand and Company Ltd.

References

1. Paul Samuelson, Economics, Tata McGraw Hill
2. Terence Byres, The Indian Economy, Oxford University Press
3. S.K.Ray, The Indian economy, Prentice Hall of India
4. Campbell McConnel, Economics, Tata McGraw Hill

Communication Skills

Objectives

- To improve Language Proficiency of the Engineering students
- To enable them to express themselves fluently and appropriately in social and professional contexts
- To equip them with the components of different forms of writing

MODULE – 1 (15 hours)

INTRODUCTION TO COMMUNICATION

Communication nature and process, Types of communication - Verbal and Non verbal, Communication Flow-Upward, Downward and Horizontal, Importance of communication skills in society, Listening skills, Reading comprehension, Presentation Techniques, Group Discussion, Interview skills, Soft skills

MODULE – II (15 hours)

TECHNICAL COMMUNICATION

Technical writing skills- Vocabulary enhancement-synonyms, Word Formation-suffix, affix, prefix, Business letters, Emails, Job Application, Curriculum Vitae, Report writing-Types of reports

Note: No university examination for communication skills. There will be internal evaluation for 1 credit.

REFERENCES

1. The functional aspects of communication skills, P.Prasad and Rajendra K. Sharma, S.K. Kataria and sons, 2007
2. Communication skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning private limited, 2010
3. Professional Communication, Kumkum Bhardwaj, I.K. International (P) House limited, 2008
4. English for technical Communication, Aysha Viswamohan, Tata Mc Graw Publishing company limited, 2008

CE010 303: FLUID MECHANICS

Teaching scheme: **Credits: 4**
2 hours lecture and 2 hours tutorial per week

Objective

- *This course gives an introduction to the fundamentals of fluid flow and its behavior so as to equip the students to learn related subjects and its application in the day to day life in a very effective manner.*

Module 1(12hours)

Properties of fluids: Definition and Units- Mass density, Specific weight, Viscosity – Classification of fluids – Ideal and real fluids, Newtonian and non – Newtonian fluids.

Fluid pressure – Atmospheric, Absolute, Gauge and Vacuum pressure, Measurement of pressure – Piezometer, manometer, mechanical gauges.

Total pressure and centre of pressure on a submerged lamina, pressure on a submerged curved surface – pressure on lock gates, pressure on gravity dams.

Module 2(12hours)

Buoyancy – Centre of buoyancy – Metacentre – Stability of floating and submerged bodies – Determination of metacentric height – Analytical & experimental methods.

Kinematics of fluids : Methods of describing fluid motion:Legrangian& Eulerian methods-Types of flow – Streamline, Path line and Streak line, Velocity potential function, Stream function, Circulation and Vorticity, Laplace's Differential equation in rectangular co-ordinates for two dimensional irrotational flow.

Flow Net – Orthogonality of stream lines and equipotential lines.

Stream tube – continuity equation for one dimensional flow.

Module 3(12hours)

Forces influencing motion – Energy of fluids, Euler's equation, statement and derivation of Bernoulli's equation and assumptions made.

Applications of Bernoulli's equation – Venturi meter, Orifice meter, Pitot tube.

Orifices and Mouth Pieces – Different types of orifices,flow over a sharp edged orifice- flow through large rectangular orifice- flow through submerged orifice-Hydraulic Coefficients-External and internal mouthpiece.

Notches and weirs – Rectangular, triangular, trapezoidal notches, Cippoletti weir, submerged weir, broad crested weir.

Module 4(12hours)

Flow through pipes: Two types of flow-Laminar and Turbulent flow – Reynold's experiment, loss of head due to friction, Darcy – Weisbach equation, Other energy losses in pipes.

Hydraulic Gradient and Total Energy Lines: Flow through long pipes – Pipes in series and parallel, Siphon, Transmission of power through pipes –nozzle diameter for maximum power transmission.

Laminar Flow in circular pipes: Hagen poiseuille equation.

Turbulent flow through pipes: Establishment of flow in pipes-hydro-dynamically smooth and rough boundary, Velocity distribution for turbulent flow in pipes.

Drag and lift for immersed bodies:

Module 5(12hours)

Dimensional Analysis and Model studies: Units and dimensions of physical quantities, Dimensional Homogeneity of formulae and its application to common fluid flow problems, Dimensional Analysis-Rayleigh's method, Buckingham's method. Derivations of dimensionless parameters, Froude's, Reynold's, Webber, Mach numbers.

Hydraulic Models: Need, Hydraulic Similitude, Geometric, Kinematic, Dynamic similarity, Scale ratios of various physical quantities for Froude's and Reynold's model laws – problems, Types of models-Undistorted and Distorted models, Scale effects in models, Spillway models and Ship models.

References

1. Streeter V. L., Fluid Mechanics, Mc Graw Hill, International Students Edition.
2. Dr. P. N. Modi & Dr. S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House Delhi.
3. Jagdishlal, Fluid Mechanics & Hydraulics, Metropolitan Book Co., Delhi.
4. R. J. Garde and A. G. Mirajoaker, Engineering Fluid Mechanics, Nem Chand & Bross., Roorkee.
5. Dr.D S Kumar,S K. "Fluid Mechanics and Fluid power Engineering", Kataria& Sons,NewDelhi
6. Dr. R.K Bansal,A Text book of Fluid mechanics and Hydraulic machines, Laxmi Publications
7. Douglas,"Fluid mechanics" 4/e Pearson Education.
8. K Subramanya, Fluid Mechanics&Hydraulic Machines, Tata Mc Graw Hill, Education Private Limited NewDelhi
9. S Ramamrutham"Hydraulics Fluid Mechanics and Fluid Machines", Dhanpat Rai Publishing Company.

CE010 304: MECHANICS OF SOLIDS I

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objective
• *To understand the strength characteristics of various structural members subjected to axial, bending, shearing and torsional loads*

Module 1(12hours)
Simple stresses and strains: Elastic constants – relation between them – Bars of varying cross section - Deformation due to self weight – Bars of uniform strength - Temperature stresses – Composite members – equilibrium & compatibility conditions.
Compound stresses: Two dimensional problems-normal & tangential stresses on an inclined plane - principal stresses and planes-maximum shear stresses & planes – Analytical &Mohr's circle methods.

Module 2(10hours)
Bending moment and shear force: Types of supports, beams &loads - Shear force and Bending moment diagrams for various types of statically determinate beams with various load combinations – relation between load, shear force and bending moment.

Module 3(12hours)
Stresses in beams: Theory of simple bending- modulus of section – bending stress & strain distribution for cross-sections symmetrical about Y-Y axis - built up sections - Composite sections Beams of uniform strength.
Shear stresses in beams: shear stress distribution in cross-sections symmetrical about Y-Y axis.

Module 4(14hours)
Stresses due to torsion: Torsion of solid and hollow circular shafts- power transmitted - stresses due to axial thrust, bending and torsion.
Shear centre- shear flow (basic concepts only)
Springs: Close coiled and open coiled

Module 5(12hours)
Columns and struts: Short and long columns-Elastic instability-Euler's formula for long columns with various end conditions – effective length - slenderness ratio-limitations - Rankine's formula
Combined bending and direct stresses in short columns
Pressure vessels: Thin and thick cylinders-Lame's equation (derivation not required)-stresses in thick cylinders due to internal pressure.

References

1. Timoshenko.S.P, Strength of Materials, Part-1, D. Van Nostrand company, Inc. Newyork.
2. Nag&Chanda, Fundamentals of Strength of Materials, Wiley India Pvt. Ltd.
3. Bansal R.K., Strength of Materials, Lakshmi Publications, New Delhi.

4. Bhavikatti S.S , Strength of Materials, Vikas Publishing House (P) Ltd.
5. Sadhu Singh, Strength of Materials, Khanna Publishers
6. D.S. Prakash Rao, Strength of Materials, Vol. I, University Press (India) Ltd.
7. Popov E.P., Engineering Mechanics of solids, Prentice Hall of India, New Delhi.
8. Punmia B.C, Strength of Materials and Mechanics of structures, Vol.1, Lakshmi Publications, New Delhi.
9. Vazirani V.N., Ratwani N. M., Analysis of Structures, Vol.1, Khanna Publishers, New Delhi.
10. Kazimi S.M.A., Solid Mechanics, Tata Mc Graw Hill.
11. Singh, Mechanics of Solids, , Prentice Hall of India, New Delhi.
12. Arthur Morley, Strength of Materials, ELBS, Longman' s Green& Company.
13. T.S.Thandavamoorthy,Analysis of Structures Strength and Behaviour,Oxford University Press,Chennai.

CE010 305 SURVEYING – I

Teaching Scheme **Credits : 4**

3 hour lecture and 1hour tutorial per week

Objective

To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.

Module 1 (12hours)

Compass surveying – Prismatic compass – surveyor's compass – bearings – systems and conversions – local attraction – Magnetic declination – dip – traversing –latitude and departure - omitted measurements – errors in compass surveying

Plane table surveying – Accessories - Different methods – radiation, intersection, resection and traversing – two and three point problems and their solutions – advantages and disadvantages - errors

Module 2 (12hours)

Levelling: levels and staves – spirit levelling – bench marks – temporary and permanent adjustments – booking - methods of reduction of levels – arithmetic checks-differential, fly, check and profile leveling - cross sectioning – curvature and refraction – difficulties in leveling - reciprocal levelling – errors in leveling – sensitiveness of bubble tube.

Contouring – characteristics and uses of contours – Locating contours- plotting.

Module 3 (13hours)

Theodolite Surveying: Transit theodolite – vernier, micrometer and micro-optic theodolites – description and uses – fundamental lines of a transit theodolite – temporary and permanent adjustments – horizontal angle – reiteration and repetition methods– booking. Vertical angle measurements.

Traversing: Methods of traversing – loose needle and fast needle methods - plotting – closing error - adjustment of closing error by graphical and analytical methods – Bowditch's rule-conditions of closure – closing error and distribution – Gales traverse table.

Tacheometric surveying: - General principles Stadia method – distance and elevation formulae for staff held vertical – Instruments constants – analytic lens – tangential method – use of subtense bar.

Module 4 (10hours)

Areas and volumes Areas – by latitude and departure - meridian distance method – double meridian distance method – co-ordinate method – trapezoidal and Simpson's method – area by planimeter. Volume – trapezoidal and prismoidal rule. Volume from contours. - Capacity of reservoirs – Mass haul curve.

Module 5 (13hours)

Curves: Elements of a simple curve – setting out simple curve by chain and tape methods – Rankine's method – two theodolite method – compound and reverse curve (parallel tangents only) – transition curves – different kinds – functions and requirements – setting out the combined curve by theodolite – elements of vertical curve.

References

1. Dr. B. C. Punmia, Surveying Vol. I & II, Laxmi Publications (P) LTD, New Delhi.
2. T.P. Kanetkar & Kulkarni, Surveying and leveling Vol. I&II A.V.G.Publications, Pune.
3. S.K. Duggal – Surveying Vol I & II Tata Mc Graw Hill Ltd, 2006.
4. Dr. K. R. Arora, Surveying Vol. I, Standard Book House New Delhi.
5. C. Venkatramaiah, Text Book of Surveying, Universities Press (India) LTD. Hyderabad.
6. S.K.Roy, Fundamental of Surveying, Prentice Hall of India, New Delhi.
7. S.K. Hussain & M.S. Nagaraj, Surveying, S.Chand & Company Limited.
8. B.N. Basak – Surveying.
9. Alak De, Plane Surveying, S.Chand &Co.

CE010 306 ENGINEERING GEOLOGY

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objectives
To make the students familiar with physical and structural geology as well as the basics of mineralogy and petrology which help them to plan accordingly for the construction of Civil engineering structures.

Module 1 (10Hrs)
Introduction: Various branches of geology - Relevance of Geology in Engineering. Geologic time scale.
Physical Geology: Geomorphic processes-Rock weathering-Formation of soils, soil profiles-soils of India – Geologic work and engineering significance of rivers and oceans.

Module 2(10Hrs)
Dynamic Geology: Interior constitution of the earth-Various methods to study the interior-crust, mantle, core-lithosphere-asthenosphere-major discontinuities-Moho, Guttenberg, Lehmann- composition of different layers-sima & sial.
Plate tectonics: Lithospheric plates-diverging, converging and transform boundaries-their characteristic features-midoceanic ridge, benioff zone and transform faults-significance of plate tectonic concept.
Earthquake: Elastic rebound theory-types of seismic waves-cause of earthquake intensity and magnitude of earthquake-Locating epicentre and hypocenter-effect of earthquake-distribution of earthquake-earthquake resistant structures.

Module 3(14Hrs)
Mineralogy: Definition and classification-important physical properties of minerals-colour, streak, lusture, transperancy, cleavage, fracture, hardness, form, specific gravity and magnetism. Study of the diagnostic physical properties and chemical composition of the following rock forming minerals: 1.Quartz, 2.Feldspar, 3.Hypersthene, 4.Auguite, 5. Hornblende, 6. Biotite, 7.Muscovite, 8.Olivine, 9.Garnet, 10.Fluorite, 11.Tourmaline, 12.Calcite, 13.Kyanite, 14. Kaolin, 15. Serpentine.
Petrology: Definition and classification-important structures and textures of igneous sedimentary and metamorphic rocks-diagnostic texture, mineralogy, engineering properties and uses of following rocks:
Igneous rocks: 1. Granite, 2. Syenite, 3. Diorite, 4. Gabbro, 5. Peridotite, 6.Dolerite, 7.Basalt 8.Pegmatite.
Sedimentary rocks: 1. Conglomerate, 2. Breccia, 3. Sandstone, 4. Limestone, 5. shale.Metamorphic rocks: 1. Gneiss, 2. Schist, 3. Slate, 4. Marble, 5. Quartzite, 6. Mylonite, 7. Pseudotachyllite.
Special Indian rock types: 1. Charnockite, 2. Khondalite, 3. Laterite.

Module 4(14Hrs)

Structural Geology: Definition-outcrop-stratification-dip and strike. Folds-definition-parts of fold-classification-recognition of folds in the field- Faults-definition-parts of a fault-classification-recognition in the field-effects of faulting and subsequent erosion on outcrops. Joints-definition-classification. Unconformites-definition-classification recognition in the field. Effects of all the above described structures in the major engineering projects like reservoirs, dams, tunnels and other important structures.

Module 5(12 Hrs)

Engineering Geology: Mass movement of earth materials-Landslides-definition, classification, causes of land slides and their corrections-Geological considerations in the selection of sites for reservoirs and dams. Geological considerations in Tunnel constructions and mountain roads-rocks as building materials.

Hydrogeology: Groundwater table-abundance and advantages-aquifer-acquiclude-acquifuge-artesian conditions and artesian wells-cone of depression– perched water table.

Recommended field work: Field trip to quarries or geologically significant places to learn - in site character of rocks in quarries/outcrops-measuring strike and dip of a formation-tracing of outcrops.

References

1. Arthur Holmes, Physical geology, Thomas Nelson.
2. Parbin Singh, Engineering & general geology, K.Katria & sons, New Delhi.
3. HH.Read, Rutleys elements of mineralogy, George Allen & Unwin Ltd, London.
4. G.W.Tyrell, Principles of petrology, B.I. Publications, Bombay.
5. M.P.Billings, Strucutural geology, Aisa publishing house, New Delhi.
6. Krynine&Judd, Engineering geology & geotechniques, Tata McGraw hill, New Delhi.
7. David Keith Todd, Groundwater hydrology, John Wiley & sons, New York.

CE010 307 MATERIAL TESTING LABORATORY - I

Teaching scheme **Credits: 2**
3 hours practical per week

Objective:
To study properties of various materials

List of Experiments

1. Tests on springs (open and close coiled)
2. Bending Test on Wooden Beams using U. T. M.
3. Verification of Clerk. Maxwell's Law of reciprocal deflection and Determination of Youngs modulus'E 'for steel.
4. Torsion Pendulum (M.S. wires. Aluminum wires and brass wires)
5. Tension test using U. T. M. on M. S. Rod, torsteel and High Tensile steel.
6. Torsion Test on M. S, Road
7. Shear Test on M.S. Rod.
8. Fatigue Test
9. Impact Test (Izod and Charpy)
10. Hardness Test (Brinell, Vicker's and Rebound)
11. Strut Test.

Note
All tests should be done as per relevant BIS.

References
1. Timoshenko.S.P, Strength of Materials, Part-1, D.Van Nostrand company, Inc.Newyork.
2. Bansal R.K., Strength of Materials, Lakshmi Publications, New Delhi.
3. Bhavikatti S.S , Strength of Materials, Vikas Publishing House (P) Ltd.
4. D.S. Prakash Rao, Strength of Materials, Vol. I, University Press (India) Ltd.
5. Popov E.P., Engineering Mechanics of solids, Prentice Hall of India, New Deihi.
6. Punmia B.C, Strength of Materials and Mechanics of structures, Vol.1, Lakshmi Publications, New Delhi.

CE010 308 SURVEYING PRACTICAL– I

Teaching Scheme **Credits :2**

3 hours practical per weak

Objective: *To impart training in surveying using Chain, Compass, Plane table , Level and theodolite.*

List of Exercises

1. Compass Survey- Traversing with compass and plotting
2. Plane table Survey- Solving Two Point Problem
3. Plane table Survey -Solving Three Point Problem
4. Leveling -Fly leveling- plane of collimation method
5. Leveling- Fly leveling- rise and fall method
6. Leveling -Longitudinal and cross sectioning
7. Leveling -Contour surveying
8. Study of Minor instruments: Planimeter, pantagraph, clinometer, hand levels, Quick setting level, Cylon Ghat Tracer, sextent
9. Theodolite : study of instrument, temporary adjustments, measurement of horizontal and vertical angles.
10. Theodolite surveying - horizontal angle by repetition & reiteration methods.
11. Heights and distances by solution of triangles

References

1. Dr.B.C.Punmia, Surveying Vol. I & II, Laxmi Publications (P) LTD, New Delhi.
2. T.P.Kanetkar & Kulkarni, Surveying and leveling Vol. I&II A.V.G.Publications, Pune.
3. Dr.K.R.Arora, Surveying Vol. I, Standard Book House New Delhi.
4. S. K. Duggal, Surveying Vol I, Mc Graw Hill,

EN010 401 Engineering Mathematics III

(Common to all branches)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *Apply standard methods of mathematical &statistical analysis*

Module 1 (12 hours)
Fourier series: Dirichlet conditions – Fourier series with period 2π and $2l$ – Half range sine and cosine series – Harmonic Analysis – r.m.s Value.

Module 2 (12 hours)
Fourier Transform : Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity.

Module 3 (12 hours)
Partial differential equations : Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's equation – Charpits method –solution of Homogeneous partial differential equations with constant coefficients.

Module 4 (12 hours)
Probability distribution : Concept of random variable , probability distribution – Bernoulli's trial – Discrete distribution – Binomial distribution – its mean and variance- fitting of Binominal distribution – Poisson distribution as a limiting case of Binominal distribution – its mean and variance – fitting of Poisson distribution – continuous distribution- Uniform distribution – exponential distribution – its mean and variance – Normal distribution – Standard normal curve- its properties.

Module 5 (12 hours)
Testing of hypothesis : Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples.

References

1. Bali& Iyengar – A text books of Engg. Mathematics – Laxmi Publications Ltd.
2. M.K. Venkataraman – Engg. Mathematics vol II 3rd year part A & B – National Publishing Co.
3. I.N. Sneddon – Elements of partial differential equations – Mc Graw Hill
4. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
5. Richard A Johnson – Miller Fread's probability & Statistics for Engineers- Pearson/ PHI
6. T. Veerarajan – Engg. Mathematics – Mc Graw Hill
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability ,Statistics and Queueing theory – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International
10. A.K.Mukhopadhyay-Mathematical Methods For Engineers and Physicists-I.K.International

CE010 402 CONSTRUCTION ENGINEERING AND MANAGEMENT

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objective:
Imparting fundamental knowledge in network scheduling techniques, details of execution of works, principles of functional planning of buildings, mechanization in construction, project cost analysis and industrial relations

Module 1 (12 Hours)
Fresh concrete – Workability-factors affecting-measurement of workability-different tests for workability-segregation-bleeding-process of manufacture of concrete-batching-mixing-transportation-compaction-curing methods-admixtures in concrete-special concretes
Joints – Construction joints – expansion joints – contraction joints – sliding joints – joints in water retaining structures etc.
Scaffolding and Formwork (elementary concepts only).
Flooring – different types – Mosaic – marble – granite – roofing – pitched and flat roofs – domes and folded plate roofs
Damp prevention – Causes – Material used – Damp proofing of floors – walls – roofs.
Finished works – plastering, painting – white washing – distempering – application of Snowcem – Concrete repairs-construction and constructed facilities.

Module 2 (12 Hours)
Functional planning of buildings – general principles of site plan – principles of functional planning – orientation of buildings – shading principles.
Modern construction materials – Intelligent buildings – building automation.
Construction management –
Mechanisation in construction – earth moving,handling, pneumatic and hoisting equipment – pile driving equipment – Earthwork computation – mass diagram – soil compaction & stabilization – owning and operating works of construction equipment.

Module 3 (12 Hours)
Introduction to job planning and Management: Bar charts and mile stone charts - work breakdown structure - C P M and PERT networks - Network and time estimates - Earliest expected time - Forward pass and backward pass - Time estimates - related problems.

Module 4 (12 Hours)
Project costs analysis: Cost Vs Time curve - optimum duration- related problems - updating, resource allocation - resource smoothing – resource leveling - Network compression - Compression limited by crashing - float- parallel critical paths - crashed critical paths – most economical solution.

Module 5 (12 Hours)

Industrial Relations: Payment of wages Act - Minimum wages Act - Employees State Insurance Act –Workers participation in management – labour welfare and social security – Industrial safety and welfare provision – role of state in labour welfare – role of labour welfare officers social security principles and practice.

References

1. M. S. Shetty, Concrete technology, S.Chand & Co.
2. S. P.Arora, Building construction, Dhanpat Rai & Sons, New Delhi.
3. Dr.Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company.
4. R.L.Peurifoy, W.B.Ledbetter, Construction Planning, Equipment, and methods, Tata Mc Graw Hill.
5. Chitkara, Construction Project Management Planning scheduling and control Mc GrawHill
6. B.L.Gupta, Amit Gupta, Construction Management and Accounts, Standard publishers and Distributors.
7 James.D.Steevens, Techniques for Construction Network Sheduling, McGraw Hill.
8. S.C.Sharma, Management of Systems, Khanna Publishers.
9. L. S. Srinath, PERT and CPM Principles and Applications, East – West Press.
10. Subir K. Sarkar,Subhajit Sarasswati ,Construction Technolgy, Oxford University press.
11. A.R. Santhakumar, Concrete Technology, Oxford university Press.

CE010 403: MECHANICS OF SOLIDS- II

Teaching scheme: **Credits: 4**

2 hour lecture and 2 hour tutorial per week

Objectives:

• *To understand the basic strength and energy theorems of Structural Mechanics and its applications*

• *To study deformations of bodies caused by externally applied forces and the internal effects produced due to moving loads.*

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Module 1 (12 hours)

Deflection of determinate beams: Differential equation of the elastic curve- slope & deflection of beams by Double integration method (concept only)-Macaulay's method - Conjugate beam method

Deflection due to shear (concept only).

Module 2 (12 hours)

Energy Theorems: Strain energy due to axial load(gradual, sudden & impact), bending, shear and torsion-principle of super position- Betti' s theorem -Maxwell' s reciprocal theorem-principle of virtual work(deformable bodies)-Castigliano' s first theorem-deflection of statically determinate beams & pin jointed frames by strain energy, virtual work and unit load methods

Module 3 (12 hours)

Moving loads and influence lines: effect of moving loads-influence lines for reaction, shear force and bending moment for determinate beams

Absolute maximum bending moment (basic concept only).

Module 4 (12 hours)

Arches: Theoretical arch-Eddy' s theorem- analysis of three hinged arches –support reactions-normal thrust-radial shear

Cables and suspension bridges: General cable theorem-analysis of cables under concentrated and uniformly distributed loads-anchor cables

Suspension bridges with stiffening girders(basic concepts only).

Module 5 (12 hours)

Theories of Elastic Failure: Maximum principal stress theory-maximum shear stress theory - maximum principal strain theory – Mohr's theory. Principle of stationary and minimum potential energy, Castigliano's theorems (theory only)

Unsymmetrical bending: Product of inertia-principal axes (basic concepts only)

References:

1.Devdas Menon, Structural Analysis, Vol.1, Narosa, Chennai.

2. Bhavikatti S.S , Structural Analysis Vol. I, Vikas Publishing House (P) Ltd.

3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.1996.

4. C. K. Wang, Intermediate Structural Analysis, Tata McGraw Hill Education Private Ltd.

5. Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.

6. Rajesekharan &Sankarasubramanian,G., Computational Structural Mechanics, Prentice Hall of India, 2001.
7. Wang C.K.& Solomon C.G., Introductory Structural Analysis, McGraw Hill.1968.
8. Sadhu Sindh, Strength of Materials, Khanna Publishers, 1988.
9. Seeli F.B.& Smith J.P., Advanced Mechanics of Materials, John Wiley &Sons, 1993.
10. Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
11. Junarker S.R., Mechanics of Structures, Vol. II, Charorbar Book Stall.
12. Timoshenko S.P, Young D.H., Theory of structures, McGraw Hill
13. Thadani B.N, Desai J.P, Structural mechanics, Weinall Book Corporation.
14. Punmia B.C., Strength of materials and theory of structures, Vol.II, Laxmi publications.

CE010 404 OPEN CHANNEL FLOW AND HYDRAULIC MACHINES

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objectives:

- *The problems that man encountered in the field of water supply, irrigation, navigation and water power resulted in the development of fluid mechanics*
- *It enables us to understand the interesting phenomenon in nature and it empowers us to design and to create variety of fluid flow equipment for the benefit of mankind*

Module 1 (12 Hours)

Flow in open Channel – Types of flow, – Velocity distribution in open channels, Uniform flow in open channels– Chezy's , Manning's and Kutter's formula, Most economical cross sections – computation of uniform flow- conveyance - Normal depth. Energy in open channel flow- specific energy. Momentum in open channel flow-specific force , Critical flow and its computation-critical flow in rectangular channels Application of specific energy and discharge diagrams to channel transitions,

Module 2 (12 Hours)

Measurent of flow in open channels-mean velocity-pitot tube,current meter,floats. Discharge in flumes and rivers

Gradually varied flow- Dynamic Equation for gradually varied flow- in wide rectangular channels-different forms of the dynamic equation, channel bottom slopes-Study of surface profiles and its Characteristics in prismatic channels, backwater computation by direct step method.

Module 3 (10 Hours)

Rapidly varied flow, hydraulic jump – initial and sequent depths, non-dimensional equation, Practical application of hydraulic jump, Types of jump in horizontal floor, Basic characteristics of the jump, Energy loss, efficiency, height of jump, jump as energy dissipater, stilling basins, Location of hydraulic jump.

Module 4 (14 Hours)

Hydraulic Machines – Impulse momentum principle, Impact of jet, Force of jet on stationary and moving plates –

Turbines – Classification, velocity triangle for Pelton, Francis, Kaplan turbines, Specific speed, selection of turbines, draft tube – types,

Module 5 (12 Hours)

Centrifugal Pumps – Types, Velocity triangle for pumps-Work done- Head of pump, Losses and efficiency, Minimum starting speed, Specific speed, Multistage pump, Pumps in parallel.

Positive displacement pumps – working principle, types of reciprocating pumps, work done- effect of acceleration and frictional resistance, slip and coefficient of discharge. Indicator diagram, separation in suction and delivery pipes. Air vessel – rate of flow into and from air vessel.

References

1. Ven Te Chow, Open Channel Hydraulics, Mc Graw Hill Ltd.
2. K. Subrahmanya, Flow in open channel vol.1, Tata McGraw Hill, New Delhi
3. Dr. P. N. Modi & Dr. S. M. Seth, Hydraulics & Fluid Mechanics, Standard Book House, Delhi.
4. Jagadheesh Lal, Hydraulic Machines, Metropolitian Book Co., New Delhi.
5. Dr. R.K Bansal,A Text book of Fluid mechanics and Hydraulic machines,Laxmi Publications
6. K.G Rangaraju, Flow through openchannel Tata Mc Graw Hill
7. Shivkumar, "Fluid Mechanics& Fluid Machines Basic concepts& Principles; Ane Books Pvt. Ltd

CE010 405 SURVEYING - II

Teaching Scheme **Credits : 4**

3 hour lecture and 1hour tutorial per week

Objective

To impart knowledge in triangulation, aerial photogrammetry and modern Electro Magnetic Distance Measurement instruments.

Module 1 (12 hours)

Triangulation: triangulation figures – classification of triangulation systems – selection of triangulation stations – intervisibility and heights of stations – station marks – signals and towers – base line – choice – measurement of base lines – instrument- extension of base- satellite stations – need, reduction to centre.

Module 2 (12 hours)

Theory of errors and triangulation Adjustments: Kinds of error – laws of weights – principles of least squares – determination of most probable value of quantities – probable error – distribution of error to the field measurements – normal equation – Method of correlatives – Adjustment of simple triangulation figures.

Module 3 (10 hours)

Hydrographic surveying –Equipment – Methods of locating soundings – reduction and plotting of soundings – use of sextants and station pointer.

Electro Magnetic Distance Measurement (EDM): - Principle of EDM – Types of EDM instruments – Distomat – Total Station – principles – procedure and surveying using Total Station – data retrieval and processing.

Module 4 (12 hours)

Terrestrial photogrammetry – General principles – photo theodolite – horizontal position of a point from photogrammetric measurements – elevation of a point – determination of focal length of lens. Aerial photogrammetry – aerial camera – scale of vertical photograph – relief displacement on a vertical photograph – principle of parallax – stereoscopic pairs – flight planning – radial line method – flying height and overlaps – remote sensing – concepts of remote sensing – ideal remote sensing system.

Module 5 (14 hours)

Geodesy – shape of earth – effects of curvature – spherical excess – convergence of meridians.

Field Astronomy: - Definitions – celestial sphere – astronomical triangle - co-ordinate systems. Determination of time, azimuth, latitude and longitude.

References:

1. T. P. Kanetkar and Kulkarni, Surveying and leveling Vol. II, A.V.G. Publications, Pune.

2. B. C. Punmia, Surveying and leveling Vol. II, Laxmi Publications (P) LTD, New Delhi.
3. Thoms M. Lillerand, Remote sensing and image interpretation, John Wiley & Sons, Inc. New York.
4. Dr. K.R. Arora, Surveying Vol. II, Standard Book House, New Delhi.
5. Alak De, Plane Surveying, S.Chand &Co.
6. S. K. Duggal – Surveying Vol I & II Tata Mc Graw Hill Ltd, 2006.
7. R. Sathikumar, Satheesh Gopi and N. Madhu, Advanced Surveying: Total Station, GIS and remote Sensing, Pearson Education, India

CE010 406 CIVIL ENGINEERING DRAWING

Teaching scheme **Credit -4**

4 hours drawing per week

Objectives:

To create awareness among students regarding the principles of building drawing and equip them to prepare plan , section, elevation , site plan and service plan of buildings as per Kerala Building Rules.

PART A

Detailed drawing of panelled door with wooden frame. (1 sheet).
Reinforced concrete staircase (1 sheet).
Roof truss using standard steel sections (1 sheet).
Roof lines (1 sheet).
Detailing of Mangalore pattern tiled roofing (1 Sheet).

PART B

Working drawings – Preparation of plan, section and elevation from line sketches (single and double storied buildings)(8 sheets).
Preparation of line sketches and working drawings of single storied RCC residential buildings, as per area and functional requirements. (2 sheets)

Preparation of site plan as per Kerala Building Rules. (1sheet)

Plumbing services-
Layout of water supply and sanitary connections for residential buildings.(1 sheet)

Mark distribution

Part A - 30 marks.
Part B - 70 marks.

References:-

1. Balagopal & T. S. Prabhu, Building drawing & detailing, Spades Publishers and distributors, Calicut.
2. Shah & Kale, Building Drawing, Tata Mc Graw Hill, New Delhi.
3. B.P.Varma, Civil Engineering drawing and House Planning, Khanna Publishers, Delhi.
4. Gurucharan Singh, Subhash Chander Sharma, Civil Engineering drawing, Standard Publishers distributors, Delhi.
5. National Building code, Kerala building byelaws.

CE010 407 SURVEYING PRACTICAL II

Teaching Scheme **Credits: 2**

3 hours practical per week

Objective

• *To give a practical knowledge in different aspects of Theodolite Surveying & Tacheometry*

List of exercises

1. Determination of tacheometric constants
2. Heights and distances by stadia tacheometry(2classes)
3. Heights and distances by tangential tacheometry(2classes)
4. Three point problem.
5. Setting out of simple curves - angular method
6. Theodolite traversing
7. Setting out of building plans
8. Study of Total station
9. Total station – Horizontal and vertical angles, Horizontal distance, Level difference.

References :

1. Dr. B. C. Punmia, Surveying Vol. I & II, Laxmi Publications (P) LTD, New Delhi.
2. T.P. Kanetkar & Kulkarni, Surveying and leveling Vol. I&II A.V.G.Publications, Pune.
3. Dr. K. R. Arora, Surveying Vol. I, Standard Book House New Delhi.
4.. S. K. Duggal , Surveying Vol I& II, Tata Mc Graw Hill.

CE010 408(ME) HYDRAULICS LABORATORY

Teaching scheme **Credits: 2**
3 hours practical per week

Objectives

To impart practical knowledge in heat engines and hydraulics laboratories

PART-A (FLOW)

1. Study of taps, valves, pipe fittings, gauges, pitot tubes, watermeters and current meters.

2. Determination of metacentric height and radius of gyration of floating bodies.

3. Hydraulic coefficients of orifices and mouthpieces under constant head method and time of emptying method.

4. Calibration of venturimeter, orifice meter and watermeter.

5. Calibration of rectangular and triangular notches.

6. Determination of Darcy s and Chezy s constant for pipe flow.

7. Determination of Chezy s constant and Mannings number for open channel flow.

8. Determination of discharge coefficient for plug-sluices.

PART –B (MACHINERY)

1. Study of reciprocating pump and components-single cylinder and multicylinder, self priming pumps and centrifugal pumps.

2. Study of impulse and reaction turbines.

3. Performance characteristics of self priming pump.

4. Performance characteristics of centrifugal pump.

5. Performance characteristics of reciprocating pump

6. Performance characteristics of Pelton wheel.

7. Performance characteristics of Francis Turbine.

8. Performance characteristics of Kaplan Turbine.

References

1. Hydraulic Machines-Jagadishlal

EN010 501A ENGINEERING MATHEMATICS IV
(Common to all branches except CS & IT)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *Use basic numerical techniques to solve problems and provide scientific techniques to decision making problems.*

Module 1 (12 hours)
Function of Complex variable : Analytic functions – Derivation of C.R. equations in cartision co-ordinates – harmonic and orthogonal properties – construction of analytic function given real or imaginary parts – complex potential – conformal mapping of z^2 , $\frac{1}{z}$ - Bilinear transformation – cross ratio – invariant property (no proof) – simple problems.

Module 2 (12 hours)
Complex integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series- Laurent's series – Zeros and singularities – types of singularities – Residues – Residue theorem – evaluation of real integrals in unit circle – contour integral in semi circle when poles lie on imaginary axis.

Module 3 (10 hours)
Numerical solution of algebraic and transcendental equations: Successive bisection method – Regula –falsi method – Newton –Raphson method - Secant method – solution of system of linear equation by Gauss – Seidel method**.**

Module 4 (10 hours)
Numerical solution of Ordinary differential equations: Taylor's series method – Euler's method – modified Euler's method – Runge – Kutta method (IV order) - Milnes predictor – corrector method.

Module 5 (16 hours)
Linear programming problem: Definition of L.P.P., solution, optimal solution, degenerate solution – graphical solution –solution using simplex method (non degenerate case only) Big -M method – Duality in L.P.P. – Transportation problem –Balanced T.P. – initial solution using Vogel's approximation method - modi method (non degenerate case only)

References

1. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
2. M.R.Spicgel , S.Lipschutz , John J. Schiller, D.Spellman – Complex variables, schanm's outline series - Mc Graw Hill
3. S.Bathul – text book of Engg.Mathematics – Special functions and complex variables – PHI
4. B.S. Grewal – Numerical methods in Engg. and science - Khanna Publishers

5. Dr.M.K Venkataraman- Numerical methods in science and Engg -National publishing co
6. S.S Sastry - Introductory methods of Numerical Analysis -PHI
7. P.K.Gupta and D.S. Hira – Operations Research – S.Chand
8. Panneer Selvam– Operations Research – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International

CE010 502 COMPUTER PROGRAMMING

Teaching Scheme **Credit: 4**

3 hours lecture and 1hour tutorial per week**.**

Objective:

To provide a strong foundation in the basics of C-Programming so that students can develop the ability to design software's.

Module I (15 Hours)

Introduction to C: The C character set- identifiers and keywords- data types-user defined data types-constants and variables-declarations- operators-expressions-statements-library input-output functions

Control statements: if, if-else, switch, -conditional and comma operators.

Module II (15 Hours)

Iterative statements: 'while', 'do-while', for 'statements-nested loops, break and continue statements.

Functions: Declarations, definition and access-passing arguments to a function – pass by value and pass by reference-recursion.

Storage classes: automatic variables-external variables-register variables-scope and lifetime of variables-macros

Module III (12 Hours)

Arrays: Single dimensional arrays-multidimensional arrays-definition-initializing arrays-passing arrays to a function- matrix operations-addition, transpose and multiplication. Pointers-declaration-operations.

Strings: definition –string handling function-comparison, concatenation and sorting of strings

Module IV (10 Hours)

Structures and union: definition –initialization-accessing structure members-array of structures-passing structure to a function –sorting of structures –binary files-reading and writing of data blocks-union.

Dynamic memory allocation - self referential structures - basic concepts of linked lists.

Module V (8 Hours)

Files :File pointers-data files-opening and closing-reading and writing-appending-error handling function-handling data in blocks-command line arguments.

References

1.B.S. Gotterfield Theory and Problems of Programming with C.TMH

2. Balaguruswamy, Programming in C, Tata Mc Graw Hill.

3. Kern Ingham , Ritchie, The C programming language, Prentice Hall.

4. Byron S Gottfried, Programming with C, Tata Mc Graw Hill.

5. Y. Kenetker, Let us C, BPB Publications.
6. V. Rajaraman, Programming with C.
7. Y. Kenetker, Exploring C, BPB Publications.

CE010 503 DESIGN OF CONCRETE STRUCTURES – I

Teaching Scheme **Credit: 4**

2 hours lecture and 2 hours tutorial per week**.**

Objective

- ***To provide the students with the knowledge of behaviour of reinforced concrete structural elements in flexure, shear, compression and tension and to enable them to design such elements.***

Module 1 (12 hours)

Working stress method: Introduction- permissible stresses-factor of safety – behaviour of R.C.C beams –assumptions-under reinforced –over reinforced and balanced sections. Theory of singly and doubly reinforced beams.

Module 2 (12 hours)

Limit state method: Concepts-assumptions –characteristic strength and load partial safety factors-limit states-limit state of collapse –limit state of serviceability. Theory of singly and doubly reinforced rectangular sections in flexure-design of simply supported and flanged beams.

Module 3 (15 hours)

Behaviour and design of one way and two way slabs-Continuous slabs-analysis using method recommended by BIS -arrangements of reinforcement in slabs. Design of flat slab (Concept only).

Module 4 (8 hours)

Design of columns: Limit state method- I S specifications-design of columns with lateral and helical reinforcement-members subjected to combined axial load and bending.

Module 5 (13 hours)

Design of footings-Isolated footing with axial and eccentric loading-combined footing. Stair cases-introduction to different types-design of simply supported flights-cantilever steps.

Note: Sketches only required for reinforcement details. Detailed drawing in drawing sheets not required.

References

1. Relevant IS codes. (I.S 456, I.S 875,SP 16)
2. Park R and Pauloy T, Reinforced concrete structures, John Wiely & sons Inc.
3. Purushothaman P, Reinforced concrete structural elements-Behaviour, Analysis and Design, Tata McGraw Hill publishing company Ltd.
4. Unnikrishna Pillai S. & D.Menon, Reinforced concrete design, Tata McGraw Hill

Publishing company Ltd.
5. Mallick S.K., Reinforced concrete, Oxford & IBH Publishing company.
6. Varghese P.C., Limit state design of Reinforced concrete, Printice Hall of India Pvt Ltd.
7. Ashok .K. Jain, Reinforced concrete- Limit state design, New Chand & Bose.
8. S.S Bhavikatti, Design of Reinforced concrete structures, I.K.International Publishing house Pvt.Ltd

CE010 504 GEOTECHNICAL ENGINEERING – I

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objective:
Geotechnical Engineering is one of the important disciplines of Civil Engineering involving the study of behaviour and engineering properties of soil.
The objective of the course is to present different laws and principles of Soil Mechanics so that the strength and settlement of the foundation soil can be evaluated.

Module 1 (15 Hours)

Soil formation and soil types: Residual soil and transported soil-Soil structure-Basic structural units of clay minerals. Simple soil properties: three phase systems - void ratio - porosity - degree of saturation - moisture content - specific gravity - unit weight relationships.

Laboratory and field identification of soils: Determination of water content, specific gravity, determination of field density by core cutter and sand replacement method, grain size analysis by sieve, hydrometer analysis - Atterberg limits and indices - field identification of soils.

Classification of soils: Principles of classification - I. S. classification - plasticity chart.

Module 2 (13 Hours)

Permeability of soils: Darcy's law - factors affecting - constant head and falling head test - permeability of stratified deposits. soil- water system - classification of soil water - capillarity of soils - principles of effective stress.

Seepage of soils: seepage pressure, critical hydraulic gradient - quick sand condition - flownet diagram for isotropic and anisotropic soils

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Module 3 (10 Hours)

Shear strength: Shear strength parameters - Mohr's circle – Mohr Coulomb strength theory -direct, triaxial, unconfined and vane shear tests- Drainage conditions - UU, CD and CD tests - choice of test conditions for field problems - measurement of pore pressure-critical void ratio and liquefaction. - Activity ,sensitivity and thixotropy

Module 4 (12 Hours)

Compaction: Objects of compaction - proctor test and modified proctor test - concept of OMC and Max. dry density - Zero air void line - factors affecting compaction - effect of compaction on soil properties - field methods-.of compaction - control of compaction.

Stability of slopes: types of failures of soil slopes - Analysis of finite slopes only-Swedish circle method - = 0 analysis and c - analysis. -Taylor's stability number and stability charts

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Module 5 (10 Hours)

Compressibility and consolidation of soils: void ratio - pressure relationship - concept of coefficient of compressibility - coefficient of volume change and compression index - normally loaded and pre loaded deposits - determination of preconsolidation pressure - Terzaghi's theory of one dimensional consolidation - time rate of consolidation - time factor - degree of consolidation - square root time and log time - fitting methods - coefficient of consolidation - calculation of void ratio - height of solids methods and change in void ratio method - settlement analysis.

References

1. Murthy V. N.S, Soil Mechanics and Foundation Engineering, Nai Sarak, Delhi.
2. Gopal Ranjan and A .S .R .Rao, Basic and Applied Soil Mechanics, New Age International Publishers.
3. Punmia B. C., Soil Mechanics and Foundation Engineering, Laxshmi Publications, New Delhi.
4. Arora K. R., Soil Mechanics and Foundation Engineering, Standard Publishers, Distributors.
5. V. Narasimha Rao and Venkatramaiah, Numerical Problems, Examples and Objective Questions in Geotechnical Engineering, Orient LongMan Publishers.
6. Lambe & Whitman, Soil Mechanics, John Wiely Publications
7. S. K. Garg, Soil Mechanics and Foundation Engineering, Khanna Publishers.

CE010 505 QUANTITY SURVEYING AND VALUATION

Teaching Scheme **Credit: 4**

3 hours lecture and 1hour tutorial per week**.**

Objective

To make the students proficient in preparing the rates and thereby adapting them to estimate the entire project.

Module 1 & 2 (26 Hours.)

Purpose of estimates- different methods-Preparation of detailed estimates and abstracts for RCC Single storey buildings - R C. Footings, Columns – T- Beams. Preparation of bar bending schedule for R. C. works such as beams and slabs.

Module 3 (12 hours.)

Preparation of specification for common materials of construction and its items of works with reference to IS specifications. Cost of materials at source - different types of conveyance and rates - head loads - preparation of conveyance statement- cost of materials at site.

Module 4 (12 hours)

Analysis of rates for earth works, mortars, RCC Works, plastering, brick works, stone works, laterite work, Pointing, form work, flooring - different types, wood works - reinforcement works.

Module 5 (10 hours)

Valuation - explanation of terms - material value, rate, years purchase - freehold and lease hold purchase - depreciation - methods of calculating depreciation - straight line method - constant percentage method, sinking fund method - and quantity survey method. Methods of valuation of land - comparative method - abstractive method. Methods of valuation of property - rental method - direct comparison with capital cost - valuation based on profit - valuation based on cost - development method - depreciation method.

References

1. Schedule of rates, KPWD
2. PWD Data Book
3. Dutta, Estimating and costing,S Dutta & Company, Lucknow
4. Rangawala S.C., Estimating & costing, Charator Anand, Delhi
5. I.S: 1200- 1968 - Methods of measurements of building and civil engineering

University Examination Pattern

Module1&2

Quantity calculation-4 items	**4x10 marks**

Module 3

Specification of any 4 items or conveyance statement as per PW D norms and cost of any 6 materials at source	**4x5 marks**

Module 4

Rate analysis of any two items	**2x10 marks**

Module 5

Problem connected with depreciation of cost	**2x10 marks**

Note:-choice should be given to questions from all the 5 modules

CE 010 506 STRUCTURAL ANALYSIS I

Teaching scheme: **Credits: 4**

3hour lecture and 1 hour tutorial per week

Objective:

To study the force and displacement methods of structural analysis of indeterminate structures , the influence line diagrams and an introduction to Finite Element Method.

Module 1 (12 hours)

Indeterminate structures- force and displacement methods of structural analysis. Force method of analysis of indeterminate structures - static indeterminacy Method of consistent deformation, Clapyron' s theorem of three moments- analysis of fixed and continuous beams

Module 2 (12 hours)

Displacement method of analysis: Kinematic indeterminacy
Slope deflection method-fundamental equations-analysis of continuous beams & portal frames (with sway and without sway)
Moment distribution method - analysis of continuous beams & portal frames (with sway and without sway).

Module 3 (14 hours)

Matrix methods: Stiffness method-stiffness-equilibrium equation
Direct stiffness method - structure stiffness matrix-assembly of structure stiffness matrix from element stiffness matrix-equivalent joint load – incorporation of boundary conditions –analysis of beams and pin-jointed frames.

Module 4 (10 hours)

Flexibility method: Flexibility **–**compatibility equation-flexibility influence coefficients – force transformation matrix-flexibility matrix-analysis of beams & frames (rigid and pin-jointed).

Module 5 (12hours)

Finite element method: Introduction to FEM-Historical development-Idealization of actual structures- Boundary conditions. General procedure of FEA-Displacement approach - shape functions

References

1.Devdas Menon, Structural Analysis, Vol.1&II, Narosa, Chennai.
2. Bhavikatti S.S , Structural Analysis Vol. I, Vikas Publishing House (P) Ltd.
3. Weaver &Gere, Matrix Analysis of Structures, East West Press.
4. Moshe F. Rubinstein – Matrix Computer Analysis of Structures- Prentice Hall, 1969.
5. Meek J.L., Matrix Structural Analysis, McGraw Hill,1971.
6. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.1996.

7. Smith J.C. Structural Analysis, Macmillian Pub.Co.1985.
8. Rajesekharan & Sankarasubramanian,G., Computational Structural Mechanics, Prentice Hall of India, 2001.
9. Mukhopadhyay M., Matrix Finite Element Computer and Structural Analysis, Oxford & IBH,1984.
10. Wang C.K.& Solomon C.G., Introductory Structural Analysis, McGrawHill.1968.

11. Pezemieniecki, J.S, Theory of Matrix Structural Analysis, McGraw Hill Co., 1984
12. Sadhu Sindh, Strength of Materials, Khanna Publishers, 1988.
13. Seeli F.B.&Smith J.P., Advanced Mechanics of Materials, John Wiley &Sons, 1993.
14. Norris & Wilbur, Elementary Structural Analysis, McGraw Hill.
15. Junarker S.R., Mechanics of Structures, Vol. II, Charorbar Book Stall.
16.O C Zienkiewicz,.Finite Element Method, fourth Edition,McGraw Hill,
17. R.D.Cook, Concepts and Applications of Finite Element Analysis, John Wiley &Sons.
19. C.S.Krishnamoorthy, Finite Element Analysis, Tata McGraw Hill .New Delhi, 1987.
20. S.Rajasekharan, Finite Element Analysis, Wheeler Publishing Co., &Sons.1993.

CE010 507COMPUTING TECHNIQUES LAB

Teaching Scheme **Credit: 2**

3 hours Practical per week**.**

Objective:

To make the students aware of recent application softwares and to develop programming skills in C language.

List of Experiments:

1. Familiarization of computer hardware, peripherals and network components. Study of operating systems like DOS, Windows. Linux etc. Commands for use of files and directives.
2. Familiarization with packages like MS Word, MS Excel, and power point.
3. Programming examples related to control statements, arrays, structures, functions, pointers and files in accordance with syllabus of C like,
    a. Solution of quadratic equations
    b .Preparation of conversion tables
    c. Summation of series
    d. Arrays manipulation
    e. Functions
    f. Recursive functions
    g. String manipulations
    h. Matrix operations
    i. .Preparation of mark lists of students, bills etc. using structures
    j. Input and out using files
    k. Simple programs of linked lists and command lime arguments

References

1. Balaguruswamy, Programming in C, Tata Mc Graw Hill.
2. Kern Ingham , Ritchie, The C programming language, Prentice Hall.
3. Byron S Gottfried, Programming with C, Tata Mc Graw Hill.
4. Y. Kenetker, Let us C, BPB Publications.
5. V. Rajaraman, Programming with C.

CE010 508 GEOTECHNICAL ENGINEERING LABORATORY

Teaching Scheme **Credit:2**

3 hours practical per week**.**

Objective:

To practice the different experiments for determination of index properties and strength of soil and to develop confidence in students to assess the suitability of soil for various construction activities

List of Experiments:

1. Determination of specific gravity, water content and particle size distribution by hydrometer method / pipette method.
2. Determination of field density of soil by sand replacement method and core cutter method.
3. Determination of Atterberg limits.
4. Proctor's compaction tests (light and heavy).
5. Permeability tests for cohesive and cohesionless soil.
6. Direct shear test.
7. Triaxial shear test.
8. Unconfined Compression test.
9. Vane shear Test.
10. Consolidation test.
11. Study on Collection and Field Identification of Soil and Sampling Techniques.

References

1. Gopal Ranjan and A .S .R .Rao, Basic and Applied Soil Mechanics, New Age International Publishers.
2. Punmia B. C., Soil Mechanics and Foundation Engineering, Laxshmi Publications, New Delhi.
3. Arora K. R., Soil Mechanics and Foundation Engineering, Standard Publishers, Distributors.
4. V. Narasimha Rao and Venkatramaiah, Numerical Problems, Examples and Objective Questions in Geotechnical Engineering, Orient LongMan Publishers.

CE010 601 DESIGN OF STEEL STRUCTURES

Teaching scheme: **Credits: 4**

2 hour lecture and 2 hour tutorial per week

Objective:

To familiarize the fundamental aspects of structural behaviour and design of steel structures satisfying the requirements such as safety,feasibility and economy of steel structures.

Module 1 (12 hours)

Loading standards - I.S structural sections - I.S specifications –Design Philosophies- Working stress method and Limit state method - design of tension members –bolted and and welded connections - design of simple and compound beams - laterally supported and unsupported.(Design examples based on Limit state method only.)

Module 2 (12 hours)

Compression members - design of columns - short and long columns - axial and eccentric loading - built up columns-moment resisting connections - lacing and battening - column base - slab base - gusseted base.

Module 3 (15 hours)

Water tanks – rectangular and circular steel tanks – connections - analysis and design of supporting towers.

Module 4 (10 hours)

Light gauge steel structures - introduction - type of sections - local buckling - stiffened and multiple stiffened elements – Design of beams with lateral supports only.

Module 5 (11 hours)

Chimneys- types - self supporting and guyed – stresses in chimneys – design of chimney stack, breech opening, base plate, connections and foundations.(Design of self supporting chimney only.)

Note: Only Sketches required. Detailed drawing in drawing sheets not required

References

1. Relevant IS Codes. (IS 800-2007 , IS 875, IS 805, IS 801, IS 811,IS 6533 Part 1, Part 2,Steel Tables)
2. Subramanian N, Design of steel structures,Oxford University Press
3.S.S Bhavikatti, Design of steel structures, I.K.International Publishing house Pvt.Ltd.
4. Ramchandra, Design of steel structures Vol. I & II, Standard book house, Delhi.
5. S.K. Duggal, Design of steel structures ,Tata Mc Graw-Hill
6. B.C.Punmia, Design of steel structures, Laxmi publications.

CE010 602 GEOTECHNICAL ENGINEERING – II

Teaching scheme: **Credits: 4**
2 hour lecture and 2 hour tutorial per week

Objective:
Civil Engineer has many diverse and important encounters with soil. The knowledge of soil Mechanics is helpful in the design of foundations, earth retaining structures ,pavements ,excavations, embankments and dams.
The objective of the course is to make the students aware of various soil investigation methods, theoretical and practical approach to calculate the bearing capacities of different foundations and the design of various sub structural elements.

Module 1 (12 Hours)

Site investigation and Soil exploration: Objectives - Planning – Stages of Explorations- - Depth and spacing of borings-Methods of explorations- test pits, borings (auger boring and wash boring)- sub surface soundings (standard penetration and cone penetration) - geophysical methods (seismic refraction and electrical resistivity methods) –Samples- disturbed and undisturbed samples -sampling tools- - Bore log - Soil profile - Location of water table.

Stress Distribution: Boussinesque's equations for vertical pressure due to point loads, line load and uniformly loaded circular area. - assumptions and limitations - Pressure bulb- Newmark charts and their use.Wetergaard's equation for point loads-appriximate methods of stress distribution.

Module 2 (12 Hours)

Earth Pressure: General & local State of plastic equilibrium. Earth pressure at rest , active and passive. Rankine's and Coulomb's theories of cohesion less and cohesive soils - Iinfluence of surcharge and water table.Rehban's and Culman's graphical methods. Sheeting and bracings in excavations.

Sheet Piles**:** Common types of sheet Piles – Uses of sheet pile walls

Module 3 (12 Hours)

Bearing capacity: Definitions - ultimate and allowable - plate load test - - Terzaghi's and Skempton's analysis - bearing capacity factors and charts - effect of water table - bearing capacity from building codes and SPT values- Methods of improving bearing capacity - vibroflotation and sand drains.

Settlement analysis: Distribution of contact pressure- estimation of immediate and consolidation settlement - causes of settlement - permissible, total and differential settlement - methods of reducing differential settlement.

Module 4 (12 Hours)

Foundation: General consideration - Functions of foundation - shallow and deep foundation - different types of foundation -Selection of type of foundation-steps involved.

Footings: Design of individual, continuous and combined footings - footings

subjected to eccentric loading - proportioning footings for equal settlement.

Module 5 (12 Hours)

Raft foundation: Types of rafts- bearing capacity equations - design procedure – floating foundation.

Pile foundation: Uses of piles - Classification of piles - Determination of load carrying capacity of axially loaded single vertical pile (static & dynamic formulae) -Pile load tests - Negative skin friction - Group action & pile spacings - Settlement of pile group.

Caissons: Open, box, and pneumatic caissons, construction details of well foundation - problems of well sinking.

Note: Structural design of foundations is not contemplated in this course.

References

1. Arora K. R, Soil Mechanics & Foundation Engineering, Standard Publishers , Distributors.
2. Joseph E.Bowles, Foundation Analysis and Design, McGraw Hills Publishing Company.
3. Ninan P. Kurian, Modern Foundations, Tata McGraw Hills Publishing Company.
4. Peck, Hansen & Thornburn, Foundation Engineering.Wiley Eastern Limited
5. W.C. Teng, Foundation Design.Prentice Hall of India
6. Hans. F. Winterkorn & Hsai Yang Fang, Foundation Engineering Hand Book, Van Nostrand Reinhold Company.
7. B. C Punmia,Soli Mechanics and Foundation Engineering,Laxmi Publications.
8. V.N.S. Murthy,Text book of Soil Mechanics and Foundation Engineering,CBS Publishers

CE010 603 STRUCTURAL ANALYSIS II

Teaching scheme **Credits: 4**

3 hour lecture and 1 hour tutorial per week

Objective:

To equip the students with the comprehensive methods of structural analysis of indeterminate structures

To give an introduction to Theory of Elasticity and Structural Dynamics.

Module 1 (10 hours)

Plastic theory – ductility of steel- plastic bending of beams- evaluation of fully plastic moment – plastic hinge – load factor – method of limit analysis- basic theorems- collapse load for beams and portal frames.

Module 2 (12 hours)

Approximate methods of frame analysis: Frames under lateral loading-portal method – cantilever method. Frames under vertical loading –substitute frame method.

Space frames – tension coefficients-tension coefficient method applied to space frames

Module 3 (12 hours)

Kani's method-continuous beams & frames (without sway only).

Influence line diagrams for statically indeterminate structures: Muller Breslau' s principle-Influence lines for reactions-shear force-bending moment-propped cantilever& two span continuous beams.

Module 4 (14 hours)

Elementary theory of elasticity: State of stress at point- stress tensor-equilibrium

Equations - stresses on arbitrary plane- principal stresses-strain components – strain tensor- compatibility equations- boundary condition equations Two dimensional problems- plane stresses - plane strain – compatibility equations in two dimensional cases- Airy's stress functions

Module 5 (12 hours)

Introduction to Structural Dynamics-Dynamic systems and loads-Free or natural vibrations-Natural Frequency- Inertia force- -D'Alembert's principle-Mathematical modeling of single degree of freedom systems- equivalent spring stiffness of combination of springs

References

1. Timoshenko S.P., Theory of Elasticity, McGraw Hill.
2. Sreenath L. S, Advanced Mechanics of Solids, Tata McGraw Hill Education P. Ltd.
3. Sadhu Sindh, Strength of Materials, Khanna Publishers, 1988.

4. Bhavikatti S.S , Structural Analysis Vol. II, Vikas Publishing House (P) Ltd.
5. Seeli F.B.&Smith J.P., Advanced Mechanics of Materials, John Wiley & Sons, 1993.
6. Vazirani & Ratwani, Analysis of Structures, Khanna Publishers, New Delhi.
7. B.C. Punmia, Theory of Structures, Vol. II, Laxmi Publishers, New Delhi.
8. Prakash Rao D.S., Structural Analysis, Universal Press Ltd, Hyderabad, 1997.
9. Ameen A, Computational Elasticity, Narosa Publishers.
10. Ray W Clough, Joseph Penzien, Dynamics of structures, Mc Graw Hill, Kogabusha Ltd.
11. Madhujith Mukopathyay, Structural Dynamics, vibrations&systems, Ane Books Pvt. Ltd, 2008.
12. V.K.Manicka Selvam, Elementary Structural Dynamics, Dhanpat Rai Publications Pvt.Ltd.
13. Mario Paz, William Leigh, Structural Dynamics, Springler.

CE010 604 TRANSPORTATION ENGINEERING - I

Teaching scheme: **Credits: 4**
3 hour lecture and 1 hour tutorial per week

Objective: *To gain an in-depth knowledge on operating characteristics of facilities such as railways and water transportation*

Module 1(15 hours)

Introduction: Transportation modes - comparison and characteristics of highway and railway. Modern developments – Surface, elevated and tube railways, light rail transit, high speed tracks - technologies

Railway track: Alignment- basic requirements and factors affecting selection, Component parts of a railway track - requirements and functions - Typical cross section - Rails – functions and requirements, Type of rail sections, rail fastenings, wear and creep of rails - coning of wheels, Train resistances and evaluation of hauling capacity and tractive effort of locomotive.

Geometric design of railway track: Horizontal curves, radius – super elevation - cant deficiency - transition curves - gradients - different types - Compensation of gradients.

Module 2 (10 hours)

Railway operation and control: Points and Crossings – Design features of a turn out – Details of station yards and marshalling yards – Signaling, interlocking of signals and points - Principles of track circuiting - Control systems of train movements – ATC, CTC – track circuiting

Module 3 (10 hours)

Tunnel Engineering: Tunnel - sections - classification - tunnel surveying - alignment, transferring centre, grade into tunnel – tunnel driving procedure - shield method of tunneling, compressed air method, tunnel boring machine, Tunnel lining, ventilation - lighting and drainage of tunnels.

Module 4 (15 hours)

Harbour Engineering: Harbours – classification, features, requirements, winds and waves in the location and design of harbours.

Break waters - necessity and functions, classification, alignment, design principles, forces acting on break water – construction, general study of quays, piers, wharves, jetties, transit sheds and warehouses - navigational aids - light houses, signals - types - Moorings .

Module 5 (10 hours)

Dock Engineering: Docks - Functions and types - dry docks, wet docks – form and arrangement of basins and docks – design and construction – dock entrances - floating dry docks, slip ways, dock entrances and caissons. Dredging – functions -

general study of dipper dredger, grapple dredger, ladder dredger and hydraulic dredger.

References

1. Rao G. V, Principles of Transportation and Highway Engineering, Tata McGraw Hill
2. Mundrey J. S, Railway Track Engineering, Tata McGraw Hill
3. S.C. Rangawala, Railway Engineering, Charotor Publishing House
4. S. C Saxena and S. P Arora., Railway Engineering, Dhanpat rai & Sons
5. Subhash C. Saxena, Railway Engineering, Dhanpat rai & Sons
6. R. Srinivasan, Harbour, Dock & Tunnel Engineering, Charotor Publishing House
7. S.P.Bindra, A course in docks and Harbour Engineering, Dhanpat rai & Sons

CE010 605 WATER RESOURCES ENGINEERING

Teaching scheme: **Credits:4**

3 hours lecture and 1 hour tutorial per week

Objective :

Students are expected to realize the importance of water resources and its application in irrigation engineering.

Module 1 (15 hours)

Irrigation: Definition-necessity of irrigation - environmental effects of irrigation - sources of water - irrigation systems- lift and flow irrigation – modes of irrigation - layout of irrigation schemes -historical development of irrigation in India through ages. Soil-water-plant relation – water requirement for crop -optimum moisture for crop growth - depth of water and frequency of irrigation -crop seasons and important crops in India. Crop period and base period - duty,delta and their relationship - factors affecting duty - commanded areas and intensity of irrigation. Consumptive use of water - evapotranspiration -determination of consumptive use - irrigation efficiencies.

Module 2 (15 hours)

Basic concepts of hydrology: Hydrological cycle and its components - rainfall - rain gauge- mean precipitation over a catchment area - run off - factors affecting runoff - hydrograph - direct run off and base flow - unit hydrograph - S. hydrograph – applications of unit hydrograph.

Estimation of runoff: Empirical formula, infiltration method, rational method - flood estimation - flood frequency, unit hydrograph method and empirical formula.

Module 3 (15 hours)

Ground water: Definitions- porosity - specific yield - specific retention - storage coefficient-coefficient of permeability and transmissibility. Ground water velocity- Darcy's equation - flow towards wells - Dupit's theory of aquifers. Wells-shallow wells - deep wells - yield of an open well - constant level pumping test and recuperation test - tube wells - strainer, cavity and slotted tube wells- factors governing the selection of site and type of tube wells. Infiltration galleries and wells.

Module 4 (15 hours)

Flow irrigation: canal system - classification of canals and their alignment - requirements of a good distribution system-balancing depth - section of canal. Design of canals in alluvial soils - silt theories - non silting and non scouring velocity. Kennedy's theory -Lacey's theory - design of unlined canal using the two theories in alluvial soils - bed load and suspended load - canal outlets - requirements of good canal outlets - non modular - semi modular - modular outlets.

Module 5 (12 hours)

Reservoir planning: Investigation - selection of site - storage zones in a

reservoir - mass inflow curve - demand curve - calculation of reservoir capacity and safe yield from mass inflow curve - reservoir sedimentation - reservoir sediment control - single purpose reservoirs - multi purpose reservoirs - useful life of a reservoir. River training works: guide banks, groynes and marginal bunds – flood control - causes - methods of flood control - principles of flood routing. Soil conservation: water logging and its control - reclamation of salt affected land.

References

1. P.M.Modi, Irrigation-water recourses and water power, Standard book house, Delhi.
2. S.K Garg, Irrigation and hydraulic structures, Khanna Publishers, Delhi
3. R.K.Linsley, M.A.Kholar&J.L.H.Paulhur, Hydrology for Engineers, Mc Grawhill bookco., New York.
4. Bharat Singer, Fundamentals of Irrigation Engineering.
5. V.B.Priyani, Irrigation and Waterpower Engg, Charota Book stall Anand.
6. Dr.B.C.Punmia&Dr.Pande.B.B.Lal, Irrigation & Water Power Engineering, Laxmi Publications

CE010 606L01 ADVANCED SURVEYING
(ELECTIVE I)

Teaching Scheme **Credit:4**

2 hours lecture and 2 hours tutorial per week**.**

Objective:

To make the students aware of the advanced methods of surveying.

Module 1(12 Hours)

Total station surveying-study of instrument-measurement of parameters-methods of surveying-transferring data-software's-auto plotter-plotting (assignment).

Module 2 (12 Hours)

Arial photogrammetry: Definition- types of photographs- geometry of photographs – parallax - pair of photographs- height determination- flight planning- stereoscopy.

Module 3 (12 Hours)

Remote sensing: Introduction and definition of remote sensing terminology- principles and methods of remote sensing- electro-magnetic radiation and spectrum- radiation sources-interference- atmospheric effects on remote sensing- atmospheric window –energy interaction with surface features-different types of platforms- sensors and their characteristics-orbital parameters of a satellite- multi concepts in remote sensing.

Module 4 (12 Hours)

Interpretation of images: Aerial photo interpretation – basic elements -techniques of photo interpretation- application of aerial photo interpretation-photographs versus maps- interpretation of satellite images- ground truth collection and interpretation and verification- advantages of multi date and multi band images.

Module 5 (12 Hours)

Applications: Applications in water resources management- land use mapping and monitoring- soil sciences- geology- agriculture- forestry - oceanography.

References

1. Thomas M. Lillesand & Raiph W. Kiefer, "Remote sensing and image interpretation", John Wiley Sons.
2. Floyd F. Sabins, "Remote sensing principles and interpretation", Freeman and company.
3. Campbell J. B, "Introduction to remote sensing", The Guilford press, London.
4. Curran P.J., "Principles of remote sensing", Longman, London.
5. Engmen E.T and Gurnay R. J.,"Remote sensing in hydrology", Chapman and Hall.
6. Wolf P.R., "Elements of photogrammetry", McGraw Hills.

CE010 606L02 OPEN CHANNEL AND COASTAL HYDRAULICS (ELECTIVE - 1)

Teaching Scheme **Credit:4**

2 hours lecture and 2 hours tutorial per week**.**

Objective:

To develop theoretical and practical knowledge on open channel flow and to acquire basic knowledge on Ocean Engineering **and related applications**.

Module 1(12 Hours)

Open channel flow-Definition-Importance-Classification of flows

Uniform flow- Resistance equation-Chezy's and Manning's equation-roughness coefficient.-factions affecting roughness coefficient- normal depth and its computation-conveyance – section factor - specific energy - specific force - diagram – critical flow - section factor -hydraulic exponent for critical flow computation and its use for trapezoidal channel-Application of specific energy and specific force in open channel

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Module 2(12 Hours)

Non-uniform flow - friction slope - differential equation of non-uniform flow - types of surface profiles - the point of control - computation by Bresse's method and the simplified step method.

.**Module 3(12 Hours)**

Hydraulic jump - sequent depths - dimensionless equation of the jump - loss of head - the jump at the foot of a spillway - criteria for the formation of a jump - use of jump as an energy dissipater. Control of jump by sills - stilling basins

Module 4(12 Hours)

Water waves - classification into periodic oscillatory, periodic progressive, uniformly progressive, solitary and stationary waves.

Ocean waves – Introduction-characteristics-classification based on wave period. Small amplitude wave theory .expression for the celerity of deep water gravity wave and shallow water gravity wave - determination of the wave length and celerity for any water depth given the deep water wave amount as wave energy (no proof).

Wave Transformations –shoaling- refraction- reflection-diffraction –wave breaking (description only.

Module 5(12 Hours)

Long period waves-astronomical tide-tsunami, basin oscillations, storm surge, climatologic effects, geologic effects(description only)

Wave forecasting - SMB method.

Coastal erosion with special reference to the Kerala Coast

Shore protection measures – break waters of different types-sea walls – tetrapods, groynes and beach nourishment.

References

1. S.M.Woodword, C.J.Posey, Hydraulic of Steady Flow in Open Channels
2. F. N. Henderson, Open Channel Flow
3. A. I. Ippen, Estuary and Coast line Hydrodynamics
4. K. E. R. I. Peechi, Coastal Engineering Publications
5. V. T. Chow, Open Channel hydraulics, Mc Graw Hill
6. Robert .M. Sorensen, Basic coastal engineering, John Willey & Sons

CE010 606 L03 AIRPORT ENGINEERING (ELECTIVE I)

Credits 4

Teaching scheme: 2 hour lecture and 2 hour tutorial per week

Objective: *To understand the various aspects of air transportation and airport operation and design.*

Module 1 (15 hours)

Introduction – history of air transport - structure and organization –- selection of site – surveys – drawings to be prepared - Airport planning – components of airport system – airport planning studies – elements of study – forecasting - levels – methodologies – extrapolation methods – market analysis models – forecasting requirements – applications

Aero plane component parts - Aircraft characteristics – classification of airports

Airport obstructions - clear zone and turning zone - zoning laws - regional planning – airport architecture – environmental considerations

Module 2 (12 hours)

Runway design – orientation - windrose and layout of runways - basic runway length and corrections required - geometric design - balanced field concept - Terminal area – planning and design – passenger flow – size of apron – apron turntable - hangars – protection from jet blast

Module 3 (12 hours)

Airport capacity – capacity and delay – runway capacity related to and not related to delay - Air traffic control – flight rules - service station – Air Traffic Control network – aids for the control of air traffic – automation in air traffic control

Module 4 (11 hours)

Airport pavements – design factors – design methods for flexible and rigid pavements – CBR method – McLoad method – Burmister method – Analytical method –design charts – Load Classification Number System – Joints in cement concrete pavements

Module 5 (10 hours)

Taxiway design - loading aprons - holding aprons - separation clearances – visual aids - airport markings - marking of runways, taxiways - Airport lighting - lighting of runways approaches, taxiways and aprons.

References

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1. S.K. Khanna, M. G. Arora, S.S. Jain, Airport Planning & Design, Nem Chand Publishers
2. S. C. Rangwala, Airport Engg., Charotar Publishing Co.
3. Robert Horenjeff & Francis X McKelvy, Planning and design of airports, Mc Graw Hill.

CE010 606L04 ADVANCED MECHANICS OF MATERIALS (ELECTIVE-1)

Teaching Scheme **Credit:4**

2 hours lecture and 2 hours tutorial per week**.**

Objective

To review and make more useful methods and results presented in the previous courses on Mechanics of materials.

To understand the limitations of the ordinary formula of Strength of materials and to extend the subject to include a variety of important topics more complex than those usually involved in earlier courses.

Module 1 (13 Hours)

Basic concepts – Body force – Surface force – Stresses and strains – Three dimensional stresses and strains – Transformation equations of 3D stresses and strains – Principal stresses & strains – States of stresses and strain – Equilibrium equations – Generalised Hooke's Law – Compatibility Conditions – Boundary conditions.

Module 2 (13Hours)

Two dimensional problems – Plane stress and plain strain – Transformation equations – Stress–strain relations – Equilibrium equations in cartesian and polar co-ordinates – Airy's stress function – Biharmonic Equilibrium – 2D problems in Cartesian coordinate – Cantilever with concentrated load at free end – Simply supported beam with uniformly distributed load.

Module 3 (12Hours)

Torsion – Torsion of prismatic bar – General solution – Warping function approaches – St. Venant's theory – Membrane analogy – Sand heap analogy – Torsion of Non Circular sections – Torsion of multi cell and thin walled open and closed sections.

Module 4 (11Hours)

Curved flexural members – Winkler- Bach formula – Equivalent area methods – Circumferential stress in curved beams having, I,T or similar cross sections – Closed ring with circumferential load and uniform loads – Chain links.

Module 5 (11Hours)

Beam on Elastic foundation – General theory – Infinite beam subjected to concentrated load – Beam with uniformly distributed loads – Short beams.

References:–

1. Timoshenko S P and Goodier J. N, *Theory of Elasticity*, Tata Mcgraw Hill International Student Edition.
2. Sadhu Singh, *Theory of elasticity*, Khanna Publishers, Delhi.
3. Srinath L. S, *Advanced mechanics of solids*, Tata McGraw– Hill Publishing Company Ltd., New Delhi.

4. Arthur P Boresi & Omar M SideBottom, *Advanced Mechanics of Materials*, John Wiley & Sons.
5. Hetenyi, *Beam on elastic foundation*

CE010 606L05 CONCRETE TECHNOLOGY
(ELECTIVE - I)

Teaching scheme: **Credits: 4**
2 hour lecture and 2 hour tutorial per week

Objective:
Concrete technology is one of the important disciplines of Civil Engineering involving the study of engineering properties and behaviour of concrete.

Module 1(13 hours)

Concrete materials: cement: Bough's chemical compositions, Additives, Test for properties of cement- Physical, Chemical, Relevance and IS specification. Hydration – Product of hydration, Phases of concrete, Structure of Hydrated cement paste (HCP), Solids in HCP, Voids in HCP, Water in HCP. Structure property relationship in HCP: Strength, Dimensional stability and Durability. Transition Zone in concrete:- Significance of transition zone, Structure of transition zone ,Strength of transition zone and Influence of transition zone. Aggregates: - requirements, size , shape and texture, Grading of aggregate, Aggregates crushing strength, Specific gravity, Flakiness index, Elongation Index, Impact value, Abrasion value, IS specification. Alkali aggregate reaction. Water: - General requirement, Quality.

Module 2 (12 hours)

Fresh Concrete: Workability - factors affecting - measurement of workability - different tests for workability - segregation - bleeding - process of manufacture of concrete - Batching - mixing - transportation - compaction - curing of concrete - curing methods - admixtures in concrete - air entraining agents - Accelerators – Retarders -workability agents - Damp proofing agents - Miscellaneous admixtures - quality control.

Module 3 (12 hours)

Elastic properties of Concrete - factors affecting modulus of elasticity – Strength of concrete: w/c ratio - gel/space ratio - Gain of strength with age. - accelerated curing tests - maturity concept of concrete - effect of maximum size of aggregate on strength - relation between compressive and tensile strength - revibration - high speed slurry mixing - creep - shrinkage - factors affecting.

Module 4 (12 hours)

Durability of concrete: - sulphate attack - methods of controlling sulphate attack. Durability of concrete in sea water - action of organic acids, mineral oils, sugar etc. on hard concrete - thermal properties of concrete - Fire resistance cracks in concrete–Remedies, Testing of Hardened concrete, flexural strength - comparison of cuube test and cylinder test - Indirect tension test methods -concrete mix design - IS methods - ACI methods - mean strength - characteristic compressive strength - Non distructive testing of concrete.

Module 5 (11 hours)

Special aggregates: light weight - artificial - natural - special concrete - no - fine concrete- high density concrete - Sulphur infilterated concrete - fibre reinforced concrete - polymer concrete polymer impregnated concrete - polymer cement concrete - properties of polymer concrete - special concreting methods - cold Weather concreting, hot weather concreting - Ferrocement.

References

1. Krishna Raju N, Concrete Technology
2. A.M. Neville, Properties of concrete
3. M.S. Shetty, Concrete Technologyeferences:
4. A.R Santhakumar-Concrete Technology- Oxford University Press

CE010 606L06 SOIL STABILITY ANALYSIS
(ELECTIVE - 1)

Teaching Scheme **Credit:4**

2 hours lecture and 2 hour tutorial per week.

Objective:

Slope stability problem like,slides,flows and falls often produce extensive property damage and therefore geotechnical engineers frequently need to evaluate the stability of existing slopes and proposed slopes. The objective of the course is to make the students aware of various causes of failures of slopes and study the remedial measures

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Module 1 (12 hrs.)

Ground water seepage- Laplace' s equations for two dimensional flow- quick sand condition- construction of flownets- confined and unconfined flow-seepage in anisotropic soil conditions-piping-design of filters.

Module 2 (12 hrs.)

Stability of earth slopes-modes of slope stability- analysis of slope stability problems- Swedish circle method- Friction circle method- Taylor' s stability chart-

Bishop' s method- stabilization measures- instrumentation.

Module 3 (12 hrs.)

Landslides: Introduction- movements associated with landslides-causes of landslides-consequences, classification and analysis of landslides-investigation of landslides-instrumentation-methods of preventing landslides.

Module 4 (12 hrs.)

Earthquake effects on soil foundation system: earth quakes- ground shakingliquefaction-ground deformations-seismic provisions in building codes

Module 5 (12 hrs.)

Underpinning: Introduction-reasons-pit underpinning-pile underpinning-driven underpinning piles-shoring-special underpinning methods-moving structures

References

1. Hans.F.Winterkorn and Hsai Yang Fang Foundation Engineering handbook - Van Nostrand Reinhold Company
2. Bowles E.J. Foundation analysis and Design. Mc Graw Hill Publishing Co.
3. Gopal Ranjan and A.S.R.Rao Basic and applied Soil mechanics New Age International Publishing Company
4. Donald.P.Coduto Geotechnical Engineering –Principlesand practices, Prentice Hall India

CE010 607 COMPUTER AIDED DESIGN AND DRAFTING LAB

Teaching Scheme **Credit: 2**

3 hours practical per week

Objective

To provide familiarity with functional requirements and regulations related to buildings and to enable students to prepare neat building drawings with CAD software so as to minimize effort and maximize output.

Exposure to different categories of building (Private, Public, Residential, Flats, Offices, Clubs/Recreational buildings etc.- **Local visit and preparation of sketches**

Functional requirements of buildings – Different functional units of a building- Requirements regarding Area, Height, Head room, Width of passage way, Lighting, Ventilation, Public amenities, Setback, Parking, clearance from electric lines, Provision and location of septic Tank-clearance from well, Familiarity with norms in National Building Code and local building rules. **Study of building plans** (Residential / Commercial / Public buildings / Office/Flats / Cottages etc.) **sanctioned by local authority**.

Preparation of 2D drawing- Advantages of CAD over manual drafting- Features of CAD software-menus and tool bars-Concept of drawing in true size- Drawing units- Drawing tools-Editing tools- Controlling display-(zoom, pan, regeneration, redraw) Productivity tools-mirror,copy,block,array,Detailing-layers,color,linetype,ltscale,hatch Inquiry –area, dimension Plotting- scale. Specifications for drawings

Preparation of 3D drawings- Concept of 3D drawing- viewpoint, real-time 3D rotation, 3D modeling techniques- wire modeling, surface modeling, surface revolution, 3D face. Elevation and thickness - addition and subtraction of 3d objects. Shading - rendering.

Application of CAD to Civil Engineering Drawing with emphasis on architectural appearance. Residential, Public buildings complete in all aspect including layout plan, section, elevation, details/specifications/joinery and site plan taken in standard scale with title block.

Exposure to 3D studio and 3D Max

A term project submitted individually and suitable for submitting to local bodies for approval incorporating local building rules and NBC provisions is compulsory for external evaluation.

Assignments:- Submission of neat dimensioned line sketches from local visit
Collection and study of approved building plan
Preparing an Elevation for given plans
Preparing Plans based on requirements of clients.

References

1. Reference manual of the package.

2. National building code of India.
3. Shah & Kale, Building Drawing, Tata McGraw Hill.
4. Balgopal T.S.Prabhu, Building Drawing and Detailing, SPADES Calicut.
5. Sham Tickoo, Understanding Auto CAD2002, Tata McGraw Hill.
6. Sham Tickoo, Auto CAD2002 with applications, Tata McGraw Hill.

CE010 608 MATERIAL TESTING LABORATORY - II

Teaching scheme **Credits: 2**

3 hours practical per week

Objective:

To study properties of concrete and its various constituent materials.

1. Tests on cement.

a) Standard consistency, initial and final setting time.
b) Compressive strength of mortar cubes.
c) Specific gravity. d) Soundness. e) Fineness.

2. Tests on fresh concrete.

a) Compaction factor test.
b) Slump test.
c) Vee-Bee test.
d) Flow table test.
e) Ball penetration test.

3. Tests on hardened concrete.

a) Compressive strength of concrete cubes.
b) Compressive strength of concrete cylinder.
c) Splitting tensile strength.
d) Modulus of elasticity.
e) Flexural strength.

4. Tests on RC beam

5. Tests on aggregates.

a) Aggregate crushing value for coarse aggregate.
b) Specific gravity of coarse and fine aggregate.
c) Bulking of fine aggregate.
d) Bulk density and percentage voids of coarse aggregate.
e) Grain size analysis of coarse and fine aggregate.

6. Tests on bricks.

a) Compressive strength. b) Water absorption. c) Efflorescence.

7. Tests on roofing tiles.

a) Transverse strength. b) Water absorption.

8. Tests on flooring tiles.

a) Transverse strength. b) Water absorption. c) Abration tests.

9. Compression tests on Laterite blocks

10. Study of

a) Strain measurements using electrical resistance- strain gauges.
b) Nondestructive test on concrete.

Note

All tests should be done as per relevant BIS.

References

1.A.R.Santhakumar,Concrete Technology,Oxford University Press,Chennai.
2. M. S. Shetty, Concrete technology, S.Chand & Co.

CE010 701 DESIGN OF HYDRAULIC STRUCTURES

Teaching scheme: **Credits: 4**
2 hours lecture and 2 hours tutorial per week

Objective: *Students are expected to know the details of major and minor irrigation structures and their design. A student, who successfully completes the course, should be able to carry out design of various hydraulic structures in the given field conditions.*

Module 1 (13 hours)
Dams: classifications - factors governing the selection of the type of dam and site of the dam- **Gravity dam**: forces acting - modes of failure and stability requirements - elementary profile and practical profile - principal and shear stress - base width of elementary profile by stress and stability criteria-stresses developed in the elementary profile - low and high gravity dam – design of gravity darn (introduction only) – galleries ,joints , keys ,water stops –foundation treatment - brief description on types of spill ways.
Module 2 10 hours)
Arch dams: types of arch dams –forces acting –design methods-design of arch dams on thin cylinder theory only– central angle for min. concrete- limitations -Introduction of other methods of design - thick cylinder theory, trial load analysis and elastic theory.
Buttress dam - types - advantages and disadvantages.
Earthen dam - types of earth dams - causes of failure - design criteria -- phreatic line in an earth dam with horizontal drainage filter - different dam sections to suit available materials and foundation.
Rock fill dam –materials of construction-impervious membrane type and earth core type (brief description only)
Module 3 (13 hours)
Diversion head works: function and component parts of diversion head works -effect of construction of weir on the regime of river- causes of failure of weirs on permeable foundation. Bligh's creep theory and its limitations - Lane's weighted creep theory - Khosla's theory and design of impermeable foundation - design of vertical drop weir - silt control devices - silt excluder, silt ejector.
Module 4 (13 hours)
Canal regulation works-design of head regulator and cross regulator- Canal falls-necessity and location of falls-types-design of vertical drop fall- Sarda type only and siphon well drop . (Design emphasizing the hydraulic aspects only)
Module 5 (11 hours)
Cross drainage works –necessity-types-design of aqueduct and syphon aqueduct.
Water power engineering: Classification of hydel plants- runoff river plants, storage plants and pumped storage plants - low, medium and high head schemes -investigation and planning - fore bay – intakes - surge tanks - penstocks -powerhouse – selection of turbine-Scroll casing - draft tube – tail race- definition of gross head - operating head - effective head - firm power –secondary power- load factor, capacity factor and utilization factor.

Note:
Only sketches are required for all designs.

References

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1. S. K.Garg, Irrigation and hydraulic structures, S. K.Garg, Khanna publishers
2. P. M. Modi, Irrigation-water resourses and water power, Standard book house.
3. B C Punmia, Pande B B Lal, Irrigation and water power engineering, Laxmi Publications
4 R. K. Linsley, M. A. Kholer, L. H. Paulhur, Hydrology for Engineerers, Tata Mc Graw Hill
5. V. B. Priyani, Irrigation and water power Engg. , Charotar Book stall.
6 G.L. Asawa , Irrigation and water resources Engg. ,New Age International Limited Publishers.
7 Sathyanarayana Murthy , Water Resources Engineering , Wiley Eastern
8 R.S.Varshney, S.C.Guptha, R.L.Guptha, Theory and design of irrigation Structures, Vol II, Nemchand &brothers, Roorkee.

CE010 702 ENVIRONMENTAL ENGINEERING - I

Teaching scheme: **Credits: 4**

2 hour lecture and 2 hour tutorial per week

Objective:

- *To understand the basic principles of Water Supply Engineering*
- *To develop knowledge in unit operations and design of water treatment systems*

Module 1(10hrs)

Scope of **Environmental Engg**. Water supply Engineering: Rural and Urban water supply systems - **water demand** - percapita demand, factors affecting percapita demand, variations in the rate of consumption, fire demand, design period, forecasting population. **Quality of water**: impurities in water and their importance - water borne diseases - analysis of water - physical, chemical and bacteriological tests - MPN total coliforms, fecal coliforms. WHO and Indian standards for drinking water.

Module 2 (10hrs)

Collection of water: intakes - location, types, pipe materials - hydraulics-of flow - design of pipes - **Pumps**: Classification - selection of pumps - location of pumping stations. **Appurtenances** in the distribution system - meters, valves, fire hydrants etc. pipe laying, testing & disinfections of mains. **Storage of water** - effect of storage on quality of water

Module 3 (15hrs)

General **layout** of treatment plant - surface water and ground water. **Aeration**, purpose of aeration. **Sedimentation** - plain sedimentation, theory of sedimentation, continuous flow sedimentation tanks. **Chemically aided sedimentation** - necessity, theory of coagulation and flocculation - generally used coagulants, dosage of coagulants- clariflocculators, design of flash mixers clarifiers and clarifloculators.

Module 4 (15hrs)

Filtration - Theory of filtration, filter media - sand for filtration. Classification of filters - design, construction, control, operation and maintenance of rapid sand filters and slow sand filters, pressure filters.

Disinfection: requirements of a good disinfectant, chlorination - action, application, and dosage chlorine demand, pre-chlorination, post chlorination, double chlorination, super chlorination, breakpoint chlorination. Other disinfectants.

Module 5(10hrs)

Miscellaneous treatment methods: color, odour and taste removal, iron and manganese removal, deflouridation, removal of hardness, desalination.

Distribution of water: pumping system, gravity system, pumping and storage system, distribution reservoirs -storage capacity of balancing reservoir, pipe grids,

methods of analysis of network. Detection and prevention of leaks in distribution system-cleaning and maintenance of distribution system, pipe corrosion and its control.

References:

1. Peavy, Rowe, Tchobanoglous, Environmental Engineering, Mc Graw Hill International Editions.
2. M.N. Rao & H.V.N. Rao, Air Pollution, Tata Mc Graw Hill Pvt. Ltd., New Delhi.
3. S. K. Garg, Environmental Engineering Vol. l & ll, Khanna Publishers, New Delhi.
4. B.C. Punmia, Water supply Engineering, Arihant Publications, Jodpur.
5. B.C. Punmia, Waste water Engineering, Arihant Publications, Jodpur.

CE010 703 DESIGN OF CONCRETE STRUCTURES – II

Teaching Scheme **Credit: 3**

2 hours lecture and 1 hour tutorial per week**.**

Objective

To provide knowledge in the structural design of selected structures.

Module 1 (10 Hrs)

Prestressed Concrete: I S specifications- general principles- analysis of prestress and bending stress -methods and systems of prestressing – losses of prestress- design of simply supported rectangular beams with constant eccentricity only.

Module 2 (10 Hrs)

Retaining walls: Types-Earth pressure diagrams- modes of failure-design of cantilever and counter fort retaining walls ("L" not included)

Module 3 (8 Hrs)

Design of continuous beams: Using coefficients given in IS 456.

Circular beams:Uniformly loaded and supported on symmetrically placed columns

Module 4 (8 Hrs)

Domes: Membrane stresses in spherical and conical domes-design of domes with uniformly distributed and concentrated loads-openings-ring beams

Module 5 (9 Hrs)

Water Tanks: types-design of ground supported and overhead water tanks- circular with flat bottom-flexible and rigid joints-design of staging-columns and bracings-IS code method.

References

1. Relevant IS codes (IS 456, IS 875, IS 1343, IS 3370 Part 2 and Part 4 ,SP 16)
2. Park R and Pauloy T, Reinforced concrete structures, John wiley & sons Inc
3. Purushothaman P, Reinforced concrete structural elements –Behaviour, analysis and design, Tata Mc Graw Hill Publishing Company Ltd
4. Unnikrishna Pillai S & Devdas Menon, Reinforced concrete, Tata Mc Graw Hill Publishing Company Ltd
5. Mallick S K, Reinforced concrete, oxford & IBH publishing company
6. Varghese P C Limit state design of reinforced concrete structures, Prentice Hall of India pvt Ltd
7. Ashok K Jain Reinforced concrete –Limit state design, new chand & bose
8. Krishna Raju, prestressed concrete oxford and ibh publishing company ltd
9. Ramamrutham S, Design of reinforced concrete structures, Dhanpat Rai publishing co
10. Punmia B C Reinforced concrete structures vol 2. Laxmi publications

CE010 704 ARCHITECTURE AND TOWN PLANNING

Teaching scheme: **Credits: 3**

2 hour lecture and 1 hour tutorial per week

Objective:

- *To understand the basic principles of architectural design and functional planning of buildings*
- *To develop knowledge in town planning concepts and related principles*

Module 1 (10 hrs)

Architecture - Definition - factors influencing architectural development, characteristic features of a style - historical examples, Theory of architectural design – pragmatic, iconic, canonic and analogic design, Creative principles - function, strength, aesthetics, primary elements in architectural design, Design principles - unity, balance, proportion, scale, rhythm, character, contrast, texture, form perception, characteristics of form, form expressive of function- form related with material and structural system. Concept of space - activity space, circulation space and tolerance space

Module 2 (15 hrs)

Functional planning of buildings: Occupancy classification of buildings -general requirements of site and building - building codes and rules - licensing of building works. Functional planning of residential, institutional, commercial, process of identifying activity areas and linkages - circulation diagrams - checking for circulation, ventilation, structural requirements and other constraints, preparing site plan and working drawings

Module 3 (10 hrs)

Building Services:- Vertical transportation: Stairs -lay out and details of timber, masonry, metal, concrete and precast-concrete stairs-Elevators-drum and traction type, passenger and service goods elevators, design constraints of passenger elevators-handling capacity, arrangement of lifts, Escalators- features, operation arrangements, location - moving walk and moving ramp.

Ventilation and Air conditioning - ventilation requirements -natural and mechanical ventilation - cross ventilation - effect of orientation - calculation of air conditioning load - summer and winter air conditioning- consideration of comfort factors such as acoustics, lighting, and thermal aspects.

Module 4 (13 hrs)

Town planning - Evolution of towns-objectives and principles of town planning- growth of towns - problems of urban growth- garden city movement, conservative surgery and comprehensive planning, Radburn plan - evolution in town planning acts and legislation - forms of planning - requirements of new towns - surveys – zoning - transportation network and planning – housing, neighbourhood unit planning, - legislation on environmental pollution - land use planning and theories.

Module 5 (12 hrs)

Planning process:- Master plan, preparation and execution- -planning standards for different land use allocation for commerce, industries, public buildings, parks and play grounds.-implementation of development plans - land acquisitions - slums - causes and clearance schemes

References:

1. G.K Hiraskar The great Ages of World Architecture – Dhanpat Rai Publications (P) Ltd.
2. Satish Chandra Agarwala – Architecture and Town Planning- Dhanpat Rai and Co
3. Banister Fletcher, History of World Architecture, Taraporevalas.
4. Broadbent, Theory of Architecture Design, John Wiley Sons
5. V.K Jain – Hand book of Designing and installation of services in building complex – khanna publishers
6. Rangwala – Town planning – charotar publishing house.
7. G.K Hiraskar – Fundamentals of Town planning – Dhanpat Rai publications.
8. Abir Bandyopadhyay – Text book of Town planning – Books and Allied (P) Ltd.
9. N.K Gandhi – Study of Town and Country planning in India – Indian Town and Country planning Association.

CE010 705 TRANSPORTATION ENGINEERING - II

Teaching scheme: **Credits :3**

2 hour lecture and 1 hour tutorial per week

Objective*: To understand the principles and design of highway, traffic and airport engineering*

Module 1 (8 hours)

Classification, alignment and surveys -classification of highways - typical cross section of roads in urban and rural areas - requirements and factors controlling alignment of roads, engineering surveys for highway location.

Geometric Elements of highways: Highway cross sectional elements - pavement surface characteristics, camber and width requirements, median, kerbs, road margins – right of way, Sight distances - over taking zone requirements and related problems.

Module 2 (14 hours)

Geometric Design of Highways

Design of horizontal alignment - speed – horizontal curves, super elevation - methods of attainment of super elevation - related problems, radius - extra widening - transition curves Design of vertical alignment - gradient and grade compensation – Vertical curves - sight distance requirements on summit and valley curves - simple problems on design of vertical alignment.

Module 3 (8 hours)

Traffic Engineering: Traffic characteristics - traffic studies and their applications Traffic control devices- Traffic signs, traffic signals, road markings and traffic islands. Types of road intersection - kerb parking (Design of traffic signals not expected).

Module 4 (8hours)

Highway materials: Aggregates - desirable properties and tests - Bituminous materials - properties and tests - sub grade soil - desirable properties.

Pavement design: Basic difference between flexible and rigid pavements -factors affecting their design – design of flexible pavements-CBR & IRC Introduction to performance grading and superpave. Types and causes of failures in flexible and rigid pavements, highway drainage.

Highway construction and maintenance: Bituminous surface dressing, bituminous macadam.

Module 5 (10 hours)

Airport Engineering: Classification of airports - Aircraft characteristics- planning, selection of site for airport - factors to be considered. Runway orientation and layout of runways: use of wind rose diagrams, basic runway length and corrections required - Imaginary surfaces - approach zone and turning zone, obstructions and zoning laws - Stop way, clearway.

Aprons: factors controlling size and number of gate positions - holding apron aircraft parking systems – passenger terminal building- typical airport layout - airport markings - marking of runways, taxiways etc. Airport lighting: lighting of runways approaches, taxiways and aprons. Air traffic control - airways, navigational aids and landing aids.

References

1. S. K. Khanna, C. E. G. Justo, Highway engineering, Nem Chand Publications.
2. L .R. Kadiyali, Traffic Engineering and Transport Planning, Khanna Publishers.
3. L.R. Kadiyali, Principles and Practices of Highway Engineering, Khanna Publishers.
4. S.K. Khanna, M. G. Arora, S.S. Jain, Airport Planning & Design, Nem Chand Publishers
4. S. C. Rangwala, Airport Engg., Charotar Publishing Co.
5. Horenjeft, Robert & Francise Mc Kelvy, Planning and design of airports, Mc Graw Hill
6. G.V. Rao, Principles of transportation and High way Engineering, Tata Mc Graw Hill, New Delhi.
7. Robert. G. Hennes, Martin Ekse, Fundamentals of Transportation engineering, Tata Mc Graw Hill.
8. Theodore M Matson, Wilbur. S. Smith, Frederick.W.Hurd, Traffic Engineering, Mc Graw Hill.

CE010 706L01 BUILDING AUTOMATION AND SMART STRUCTURES
(Elective II)

Teaching Scheme **Credit:4**

2 hours lecture and 2 hours tutorial per week**.**

Objective:

The course is designed to give an insight into the latest developments in construction field regarding the automated building services, smart materials and their use in structures.

Module 1 (14 hours)

Building Automation: Introduction, Building automation in residential buildings and commercial buildings, Difference between building automation and building control, Systems in building automation and building control, Structure of building automation and control networks, Energy management functions at management level, Room automation.

Module 2 (12 hours)

Building service control systems: Introduction, Building Management System (BMS)-control theory, benefits, Safety systems- life safety system, access control system, smoke detection system, fire sprinkler system, Comfort systems- occupancy sensors, temperature sensors, smart glass, light control system

Module 3 (12hours)

Eco friendly buildings – concepts of Green building, sustainable sites, brown field development, water conservation, energy conservation, ozone depletion, eco friendly building materials and resources, indoor environment quality maintenance, new innovative building designs for eco friendliness.

Module 4 (11hours)

Smart materials: Introduction, Piezoelectric materials, Piezoelectric properties, Vibration control, Embedded actuators, Fiber optics, Fiber characteristics, Fiber optic strain sensors, Applications of optical fibers, Electrorheological and Magnetorheological fluids, mechanism and properties, Applications.

Module 5 (11 hours)

Control of structures: Control strategies and limitations, Classification of control systems, Classical control, Modern control, Optimal control and Digital control.

References;

1. Clements-Croome D.J., *Intelligent Buildings: Design, management and operation*, Thomas Telford, London, 2004.
2. Craighead G., *High-rise security & fire life safety*, Butterworth-Heinemann, Boston, Amsterdam, 2003.
3. Atkin B., *Intelligent Buildings: Application of IT and Building Automation to High Technology Construction Projects*, Kogan Page, Michigan, USA, 1988.

4. Shengwei Wang, *Intelligent Buildings and Building Automation*, Taylor & Francis, New York, 2010.
5. H. Merz, T. Hansemann, C. Hübner, *Building automation: communication systems with EIB/KNX, LON and BACnet*, Carl Hanser Verlag, Germany, 2009.
6. IGBC, *Leadership in Energy and Environmental Design* (LEED-INDIA) Green Building Rating System.

CE010 706L02 GROUND IMPROVEMENT TECHNIQUES (Elective -II)

Teaching Scheme **Credit: 4**

2 hours lecture and 2 hours tutorial per week.

Objective:

The rapid urban and industrial development pose an increasing demand for land reclamation and utilization of unstable and environmentally affected ground.
The objective of the course is to provide an opportunity to the students to familiarize with the recent developments and techniques in geo technical Engineering to improve the properties of such problematic /difficult soils.

Module 1 (15 Hrs)

Necessity of soil improvement-selection of improvement method- mechanical stabilization-effect on engineering properties-dewatering-well-point system electro osmosis-pre-loading- sand drains- methods of installation-vibroflotation and stone columns.

Module 2 (11 Hrs)

Chemical stabilization- cement stabilization- factors affecting soil cement mixing-admixtures- lime stabilization-effect of lime on soil properties -construction of cement / lime stabilized bases-bituminous stabilization- thermal stabilization- electrical stabilization.

Module 3 (11 Hrs)

Introduction to grouts and grouting- basic functions –classification of grouts-suspension grout and solution grout- groutability ratio –-properties of grouts- fluidity and viscosity, bleeding and stability,, rigidity and thixotropy, strength and permeance- grouting applications-seepage control in soil and rock under dams and for cut off walls-stabilization grouting for underpinning.and other applications

Module 4 (12 Hrs)

Earth Reinforcement- mechanism and concept- advantages-factors affecting-uses -design theories and stability analysis of retaining wall-external and internal stability-tie back analysis-coherent gravity analysis- application areas of earth reinforcement

Module 5 (11 Hrs)

Geotextiles: Soil improvement with geotextiles- classification- concepts-geotextiles as reinforcement, separators, filters, and drainage media-damage and durability of geotextiles

References

1.Purushotama Raj,P. Ground Improvement Techniques, Laxmi Publications
2.Koerner, R.M.,Construction and Geotechnical Methods in Foundation Engineering. Prentice Hall
3. Koerner, R.M.,Designing with Geosynthetics,Prentice Hall

4.Swami Saran., Reinforced soil and its Engineering applications, I K International Publishing house
5.Sivakumar Babu., An Introduction to Soil reinforcement and Geosynthetics.,University Press.
6.Shroff A.V. and Shah D.L.,Grouting Technology in Tunelling and Dam construction. Oxford and IBH Publishing Co

CE010 706 L03 PRESTRESSED CONCRETE (Elective II)

Teaching Scheme **Credit: 4**

2 hours lecture and 2 hours tutorial per week.

Objective:

Pre stressed concrete constructions are gaining its importance in Civil engineering .
To under stand the analysis, systems and applications of pre stressed concrete structures.

Module 1 (10 hrs)

Introduction – Basic concept of prestressing – Materials for prestressed concrete - Classification of prestressed concrete – Advantages of prestressed concrete over reinforced concrete – Modes of failure of prestressed concrete – Systems of prestressing – Tensioning devices – Pretensioning – Post tensioning - Thermo elasic and chemical prestressing.

Module 2 (10 hrs)

Analysis of prestress – Extreme fibre stresses – profile of tendons – Concept of load balancing – pressure line or thrust line – Internal resisting couple – Deflection of beams – Load ddeflection curve.

Module 3 (12 hrs)

Losses of prestress – Loss due to elastic shortening, shrinkage, creep, relaxation of steel – Loss due to anchorage slip – Loss due to friction – Overcoming friction loss – Design of tension members.

Module 4 V(14 hrs)

Elastic design of sections for flexure – sections and sections unsymmetrical about one axis – Design without tension and with tension – Design for shear and torsion – Ultimate moment of resistance.

Module 5 (14 hrs)

Anchorage zone – Stress distribution in end block – anchorage zone reinforcement – design of end block as per IS :1343 only – continuous beam – primary moment, secondary moment and resultant moment – concordant cable profile – Guyon's theorem – Evaluation of secondary moment.

References:–

1. N.Krishnaraju *Prestressed Concrete*, Tata McGraw-Hill Publishing Company 3rd Ed. (1985)
2. T.Y. Lin,*Design of Prestressed Concrete Structures*, John Wiley & Sons.
3. R. Rajagopalan, *Prestressed Concrete*, Narosa Publishers
4. IS: 1343, *Code of Practice for Prestressed Concrete*, Bureau of Indian Standards, New Delhi

CE 010 706L04 ENVIRONMENTAL IMPACT ASSESSMENT (Elective II)

Teaching Scheme **Credit:4**

2 hours lecture and 2hours tutorial per week**.**

Objective:

- *To understand the basic principles of Environmental Impact Assessment*
- *To develop knowledge in various processes involved in EIA with case studies.*

Module 1 (14 hours)

Introduction: Concepts of environmental impact analysis, key features of National environmental policy act, Environmental protection acts, EIA methodologies - Screening and scoping - matrix and network methodologies for impact identification, description of the affected environment – environmental indices. Rapid EIA and Comprehensive EIA

Module 2 (14 hours)

Prediction and Assessment of Impact on Air and Water Environment: Basic information on air quality, sources and effects of air pollutants, key legislations and regulations, impact prediction approaches, assessment of significance of impacts, identification and incorporation of mitigation measures

Assessment of impact on water quality (surface and ground water), Vegetation and wildlife.

Module 3 (12 hours)

Prediction & Assessment of Impact on Noise & Social Environment: Basic information on noise, key legislation and guidelines, impact prediction methods, assessment of significance of impacts, identification and incorporation of mitigation measures, Environmental Risk Analysis, Definition of Risk, Consequence Analysis.

Module 4 (10 hours)

Decision Methods for Evaluation of Alternative: Development of decision matrix. Public participation in environmental decision making, techniques for conflict management and dispute resolution, verbal communication in EIA studies.

Module 5 (10 hours)

Introduction to Environmental Management Systems, Environmental Statement-procedures, Environmental Audit: Cost Benefit Analysis, Life cycle Assessment, Strategic EIA

References:

1. Canter L.W., Environmental impact assessment, McGraw-Hill, 1997
2. Betty Bowers Marriott, Environmental Impact Assessment: A Practical Guide, McGraw-Hill Professional, 1997.
3. Peter Morris & Riki Therivel, Methods of Environmental Impact Assessment, Routledge, 2001.
4. Denver Tolliver, Highway Impact Assessment, Greenwood Publishing Group, 1993.
5. R. K. Jain, L. V. Urban, G. S. Stacey, H. E. Balbach, Environmental Assessment, McGraw-Hill Professional, 2001.
6. Relevant IRC & CPCB codes.

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CE010 706L05 THEORY OF PLATES AND SHELLS (Elective-II)

Teaching Scheme **Credit:4**

2 hours lecture and 2hours tutorial per week**.**

Objective :

To develop the skills for the analysis of advanced structures in civil engineering.

Module 1 (12 hrs)

Plates – Introduction – Classification of plates – Thin plates and thick plates – Assumptions in the theory of thin plates – Differential equation for cylindrical bending of rectangular plates – Pure bending of plates **–** Slope and curvature of slightly bent plates – Relation between bending moment and curvature in pure bending.

Module 2 (12 hrs)

Laterally loaded rectangular plates – Small deflections of laterally loaded thin plates – Differential equation of plates – Derivation of fourth order differential equation – Boundary conditions – Simply supported, built- in and free edges.

Module 3 (12 hrs)

Shells – Structural behaviour of shells – Parts of a shell – Classification of shells – Translational, rotational and ruled surfaces – Gauss curvature – Synclastic and anticlastic surfaces – Hyperbolic paraboloid – Elliptic paraboloid – Conoid.

Module 4 (12 hrs)

Classical theories of shells – Thin shell and thick shell – Stress resultants – Membrane theory of cylindrical shells – Formulation of equilibrium equations – Bending theory of cylindrical shells – Equilibrium equations – Beam theory.

Module 5 (12 hrs)

Circular cylindrical shells – Equilibrium equations – Expression for strain – Deformation of circular cylindrical shell – Cylindrical shell with uniform internal pressure – Pressure vessels – Calculation of bending moment and stresses in pressure vessels – attenuation length of edge effects.

References:

1. S.P Timoshenko, S.W Krieger, *Theory of plates and shells*, Mc Graw Hill.
2. J Ramachandran, *Thin shell theory and problems*, Universities press.
3. Krishna Raju N., *Advanced Reinforced Concrete Design*, CBS Publishers and distributers, New Delhi.
4. G.S Ramaswamy, *Design and Construction of Concrete Shell Roofs*, Tata- McGraw Hill Book Co. Ltd.,.

CE010 706L06 TRAFFIC ENGINEERING AND MANAGEMENT (ELECTIVE-II)

Teaching Scheme **Credit:4**

2 hours lecture and 2hours tutorial per week**.**

Objective

The basic objective of this course is to introduce to the students the knowledge of traffic surveys and studies . The course also tries to expose the students, traffic management, capacity studies design of intersections, safety studies and the theories of traffic flow. They also become familiar with various traffic control and traffic management measures.

Module 1 (12 hrs)

Traffic management - scope of traffic management measures - restrictions to turning movements - one way streets - tidal flow operation - regulation of traffic - Need and scope of traffic regulations- Motor Vechicle Act - Speed limit at different locations- regualtion of the vechicle - regulations concerning the driver rules of the road enforcement.

Module 2 (12 hrs)

Highway capacity: Its importance in transportation studies - basic, possible and practical capacity - determination of theoretical maximum capacity -passenger car units - level of service - concept in HC manual - factors affecting level of service.

Module 3 (12 hrs)

Design of Intersection: Design of at grade & grade seperated intersection – rotary intersection - capacity of rotary intersection - traffic signals - design of fixed timesignal - pretimed signalised intersection - performance - Websters approach for the design.

Module 4 (12 hrs)

Traffic Safety: causes of road accidents - collection of accident data – influence of road, the vehicle .the driver, the weather and other factors on road accident - preventive measures.

Module 5 (12 hrs)

Traffic Flow: theory of traffic flow - scope - definition and basic diagrams of traffic flow- basic concepts of light hill - Whitham's theory - Car 'following theory and queuing

References

1. Khadiyali L.R. Traffic Engineering and Transport planning, Khanna Tech Publishers
2. Khanna O.P and Jesto C.G; Highway Engineering, Nem Chand Publishers
3. Martin, Whol, Traffic system Analysis for Engineers
4. Donald Drew, Traffic Flow Theory

CE010 707 COMPUTER APPLICATIONS LAB

Teaching scheme: **Credits: 2**
3 hour practical per week

Objective:
To familiarize the students on the software packages for analysis , design and project management

Module I & II

- INTRODUCTION

Overview and the Environment of STAAD pro Package.

- GENERAL DESCRIPTION

Type of structure, Unit systems, structure geometry and Co-ordinate systems, global co- ordinate system, Local co-ordinate systems

- STAAD III -Commands- Using Edit Input-Command Formats-Text Input.
- STAAD PRE- Graphical Input Generation-"Concurrent" Verifications-Library- Geometry Generation – Dimensioning.
- STAAD POST – Graphical Post Processing – Animation – Icons – Isometric View – Zooming-Results of Analysis & Design – Query reports.
- LOAD – Member Load, Element Load, Joint Load, Floor Load, Self weight Command, Load case no, Load Combination .Load Generation for Wind Load, Seismic Load and Moving Load
- FINITE ELEMENT ANALYSIS & Dynamic Analysis.
- DESIGN for Concrete and Steel Structures using IS: 456 and IS 800 respectively.

Note

The student has to practice the above topics by working out problems in
1. Analysis and design of beams and trusses, Steel and RCC framed structures.
2. Analysis and design of multi-storied framed structures.

Module III & IV

Project management using CPM/PERT Software
(Microsoft Project /PRIMAVERA software)
1. Practice on the GUI of the software and Input of Date
2. Practice on Creating Bar Charts/Ghant charts
3. Practice on creating CPM/PERT charts and finding out critical path.
4. Practice on resource allocation and leveling of resources.
5. Practice on Project Monitoring (Cost &Time)
6. Plotting and printing of various charts and project

Note

The student has to practice the above topics by doing Project Management for Turn key projects related to Civil Engineering applications.

References

1. STAAD III Reference Manual
2. MS Project/PRIMAVERA Reference Manual

CE010 708 TRANSPORTATION ENGINEERING LAB

Teaching scheme: **Credits: 2**
3 hour practical per week

Objective:
*To make the students aware of the properties of various materials used in road constructions***.**

TEST ON SOIL
1.Califormia bearing ratio method.
TEST ON BITUMEN
2. Softeningpoint of Bitumen
3. Ductility test on Bitumen
4. Specific gravity of Bitumen
5. Flash and fire point test
6. Stripping value test
7. Viscosity using Viscometer
TESTS ON ROAD AGGREGATES
8. Aggregate crushing value test
9. Impact value test
10. Specific gravity test
11. Shape tests - Flakiness index and elongation index
12. Los angles abrasion test
13. Bulk density, specific gravity, void ratio and porosity of coarse aggregate, water absorbtion.
TESTS ON MIXES
14. Marshell stability value
15. Determination of bitumen content by bitumen extractor.

References

1. S. K.Khanna, C. E. G. Justo, Highway engineering, Nem Chand Publications.
2. L .R. Khadiyali, Principles and Practices of Highway Engineering, Khanna Publishers.

CE 010 709 Seminar

Teaching scheme **credits: 2**

2 hours practical per week

The seminar power point presentation shall be fundamentals oriented and advanced topics in the appropriate branch of engineering with references of minimum seven latest international journal papers having high impact factor.

Each presentation is to be planned for duration of 25 minutes including a question answer session of five to ten minutes.

The student's internal marks for seminar will be out of 50. The marks will be awarded based on the presentation of the seminar by the students before an evaluation committee consists of a minimum of 4 faculty members. Apportioning of the marks towards various aspects of seminar (extent of literature survey, presentation skill, communication skill, etc.) may be decided by the seminar evaluation committee.

A bona fide report on seminar shall be submitted at the end of the semester. This report shall include, in addition to the presentation materials, all relevant supplementary materials along with detailed answers to all the questions asked/clarifications sought during presentation. All references must be given toward the end of the report. The seminar report should also be submitted for the viva-voce examination at the end of eighth semester.

For Seminar, the minimum for a pass shall be 50% of the total marks assigned to the seminar.

CE 010 710 Project Work

Teaching scheme **credits: 1**

1 hour practical per week

Project work, in general, means design and development of a system with clearly specified objectives. The project is intended to be a challenge to intellectual and innovative abilities and to give students the opportunity to synthesize and apply the knowledge and analytical skills learned in the different disciplines.

The project shall be a prototype; backed by analysis and simulation etc. No project can be deemed to be complete without having an assessment of the extent to which the objectives are met. This is to be done through proper test and evaluation, in the case of developmental work, or through proper reviews in the case of experimental investigations.

- The project work has to be started in the seventh semester and to be continued on to eighth semester.
- Project work is to be done by student groups. Maximum of four students only are permitted in any one group.
- Projects are expected to be proposed by the students. They may also be proposed by faculty member (Guide) or jointly by student and faculty member.
- Students are expected to finalise project themes/titles with the assistance of an identified faculty member as project guide during the first week of the seventh semester.

The progress from concept to final implementation and testing, through problem definition and the selection of alternative solutions is monitored. Students build self confidence, demonstrate independence, and develop professionalism by successfully completing the project.

Each student shall maintain a project work book. At the beginning of the project, students are required to submit a project plan in the project book. The plan should not exceed 600 words but should cover the following matters.

- ❖ Relevance of the project proposed
- ❖ Literature survey
- ❖ Objectives
- ❖ Statement of how the objectives are to be tackled

- Time schedule
- Cost estimate

These proposals are to be screened by the evaluation committee (EC- minimum of 3 faculty members including the guide) constituted by the head of department, which will include a Chairman and the EC will evaluates the suitability and feasibility of the project proposal. The EC can accept, accept with modification, request a resubmission, or reject a project proposal.

Every activity done as part of project work is to be recorded in the project book, as and when it is done. Project guide shall go through these records periodically, and give suggestions/comments in writing in the same book.

The students have to submit an interim report, along with project work book showing details of the work carried out by him/her and a power point presentation at the end of the 7^{th} semester to EC. The EC can accept, accept with modification, request a resubmission, or extension of the project.

The student's internal marks for project will be out of 50, in which 30 marks will be based on day to day performance assessed by the guide. Balance 20 marks will be awarded based on the presentation of the project by the students before an evaluation committee consists of a minimum of 3 faculty members including the guide.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.

CE010 801 ADVANCED STRUCTURAL DESIGN

Teaching scheme: **Credit: 4**
3hours lecture and 2 hours tutorial per week

Objective:

To familiarize students with behavior and design procedure of some of the special structural elements so that they can perform better in the analysis and design of these structures in practical situations.

Module 1 (15 Hrs)
Road bridges: IRC Loadings and Specifications-T beam bridges – box culvert (Design forIRC Class A Loading only**)**- Bearings(Theory only)

Module 2 (15 Hrs)
Shell structures: general principles for membrane theory for symmetrical uniformly distributed load- design of a simply supported single barrel cylindrical shell for membrane stresses. Folded plates: general principles- structural behaviour of plates (design not required)

Module 3 (14 Hrs)
Industrial buildings: roof loads- design of trusses (analysis not required) -design of purlins-design of bracings and supporting system. (Problems not expected.)

Module 4 (15 Hrs)
Design of Plate girders and gantry girders- welded compound sections

Module 5(16 Hrs)
Steel bridges: IS specifications-design of highway and railway bridges of plate girder type.(Design of bracings not required.)
Note:
Sketches only required for reinforcement details. Detailed drawing in drawing sheets not required.

REFERENCES

1. IRC Bridge code,Indian railway bridge code, IS 456.IS 800,IS 875
2. Victor J D, Design of concrete bridges, oxford & IBH publishing company,new delhi
3. Krishna Raju, Advanced design of concrete structures, oxford & IBH publishing company,new delhi
4. Ramchandra, Design of steel structures vol 2 standard book house, delhi
5. Ramaswamy G S Design and construction of concrete shell roofs, Mc Graw Hill

CE010 802 BUILDING TECHNOLOGY AND MANAGEMENT

Teaching scheme: **Credits: 4**
2 hours lecture and 2 hours tutorial per week

Objective: *To impart theoretical knowledge as well as awareness to practical concepts in project implementation giving emphasis on three essentials of project management; (1) avoiding time over-run, (2) avoiding cost over-run, (3) maintaining total quality management*

Module 1 (12 Hrs)
Concrete Mix Design: General concepts. BIS method of mix design, American standards of mix design, IS-method of mix design, Durability concepts in mix design - Requirements and tests of materials required for mix design.-Fibre reinforced concrete- High performance concrete.
Form work. General arrangements – general requirements – common faults – materials for form work – form work arrangements – form work design – loads on forms – design procedure – form work vibration for compaction of concrete – stripping time and shoring.

Module 2 (12 Hrs)
Prefabricated construction: Advantages, foundation units, wall panels, frames for opening, walls–units for roofs and floors – low cost roof systems. Hollow concrete blocks, Ferro cement – use and application – modular co-ordination – method of production – flow line method – station method – manufacturing process for structural units.
Codification and Standerdisation- Value analysis: Various methods and techniques. Cost time analysis in Network Planning.

Module 3 (12 Hrs)
Construction company organization: Different types of organizational set up – construction team – objectives of civil engineering management – duties and responsibilities of a civil engineer – functions of construction management. Technical planning.
Site organization: Organization of labour, resources, materials, method of execution of the project – inspection and quality control- safety in construction.

Module 4 (12 Hrs)
Materials Management: Functions of materials management – inventory control techniques.
Construction contracts: Item rate contract – Lump-sum contract –Labour contract – Negotiated contract – Global contract – Percentage contract – Cost plus percentage contract- Cost plus fixed fee contract- Cost plus fluctuating fee contract – Target contract – All in contract.

Module 5 (12 Hrs)

Claims manual for a construction organization: Law of contract - Extra work and deviation order – claims – owner' s claim – sub contractor' s claim – disputes and arbitration – consequences of mistake in contracts – terms and conditions of contract – contract documents – earnest money – security deposit – warranty period – contract signed under coercion – contract signed by minors, insane or drunken persons – authority to agree and find, validity of an oral agreement – conditions and warranties – express terms and implied terms – voidable contracts and their performance – illegal and voidable contracts – liability for tort in contract- litigation – breach of contract and remedies – discharge of contract – equity, privity of contract – transfer of contractual rights and obligations.

References

1. Gambhir. M. L, Concrete Technology, Mcgrawhill
2. M .S Shetty, concrete technology, S. Chand & Co.
3. A.R Santhkumar-Concrete Technology-Oxford University Press
4. S. P Arora, Building constructions, Dhanpat Rai & sons, New Delhi.
5. B. L Gupta, Amit Gupta, Construction Management and accounts, standard publishers and Distributions.
6. Construction Management and accounts – V .N Vazirani.
7. Construction Engineering & Management, S. Seetharaman, Umesh Publications, Delhi.
8. Donald S Barrie & Boyd C Paulson - Professional Construction Management, Mc Graw Hill
9. P.S. Gahlot & B.M.Dhir , Construction Planning and Management, New agw International
10. Knatson, Conctruction Management fundamentals, McGraw Hill.

CE010 803 ENVIRONMENTAL ENGINEERING - II

Teaching scheme: **Credits: 4**

2 hours lecture and 2 hours tutorial per week

Objective:

- *To understand the basic principles of Wastewater Engineering*
- *To develop knowledge in unit operations and design of wastewater treatment systems*

Module 1 (10hrs)

Introduction to sanitary engineering. Sewerage systems – separate, combined and partially combined systems.

Quantity of sewage: sanitary sewage - sources, factors affecting. Fluctuations in sewage flow, peak factor.

Characteristics of sewage: physical, chemical and biological characteristics and analysis. population equivalent, relative stability.
Storm sewage: Factors affecting, intensity of rainfall, rational and empirical formula, time of concentration, intensity - duration curve and formula.

Design of sewers: Flow formula, minimum and maximum velocity of flow, effect of variation of discharge on velocity, use of partial flow diagrams, design of circular sewers, longitudinal and cross section of sewer lines.

Module 2 (10hrs)

Construction of sewers: Materials of sewers, crown corrosion.

Sewer appurtenances: inlets, catch basins, clean outs, manholes, drop manholes, lamp holes/flushing tanks, grease and oil traps, inverted siphons, storm regulators.
Sewage pumping: classification and capacity of pumps.

Natural methods of wastewater disposal: land disposal -. Sewage farming - disposal by dilution - self purification of streams - oxygen sag curve - dilution into sea, comparison of disposal methods.

Module 3 (10hrs)

Objectives of waste water treatment - Effluent standards, KSPCB Standards, BIS Standards. **Layout** of conventional treatment plant - preliminary, primary, secondary and tertiary treatments in general.

Screens - types of screens, design, disposal of' screenings; comminutors. **Grit chamber** - function, design, construction and operation, disposal of grit, detritus tank. **Skimming tank** -function, design and operation, disposal of skimmings **Sedimentation**: Theory of sewage sedimentation - design, construction and operation, rectangular and circular tanks, disposal of sludge.

Module 4 (15hrs)

Biological process: principle and theory of biological treatment**.** Sewage filtration: **Trickling filters** - design, construction and operation. **Activated sludge process**: Design, construction and operation of conventional and extended aeration, aeration methods. **Miscellaneous methods**- Stabilization ponds, Oxidation ditch, Aerated lagoons, rotating biological contactors; disinfection of sewage effluents.

Module 5 (15hrs)

Sludge treatment and disposal: quantity of sludge, characteristics of sludge, sludge thickening, digestion, conditioning and disposal, design of sludge digesters only. **Septic Tanks**: Design (as per Ministry of urban development) construction, disposal of effluents, cleaning of tanks, Imhoff tanks. Sewage treatment by **high rate anaerobic methods**: Anaerobic digestion, suspended growth, contact process, UASB, attached growth, filters, expanded bed - only basics.

References

1. Peavy, Rowe, Tchobanoglous, Environmental Engineering, Mc Graw Hill International Editions.
2. S. K. Garg, Environmental Engineering Vol. l & ll, Khanna Publishers, New Delhi.
3. B.C. Punmia, Water supply Engineering, Arihant Publications, Jodpur.
4. B.C. Punmia, Waste water Engineering, Arihant Publications, Jodpur.
5. Metcalf & Eddy, Waste water Engg.- Treatment and Reuse, 4th Edn., Mc Graw Hill International Editions.
6. Mark J Hammer, Water and waste water technology, John Wiley and sons, Inc.

CE010 804L01 ADVANCED FOUNDATION DESIGN (Elective III)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective:

After acquiring the basic knowledge in soil mechanics and foundation engineering, this course is offered as an elective with the objective of giving in depth knowledge in the design of foundations for different structures and in difficult soils.

Module 1 (12 hrs)

Well foundations: Introduction- Applications-Different shapes of wells-grip length-scour depth-design depth-forces acting on well foundation-Terzaghi's method of analysis (only general case)-bearing capacity based on N value(only IS recommendation)-design of individual components of well-sinking of wells-measures for rectification of tilts and shifts. Features of Box(floating) caisson and pneumatic caisson

Module 2 (12 hrs)

Soil dynamics and Machine foundations: Introduction- Soil behavior under dynamic loads and application-Difference between static and dynamic load behavior-soil properties relevant for dynamic loading- free vibrations and forced vibrations- determination of dynamic soil constants in laboratory and field based on IS code provisions Types of machines-Types of machine foundations -vibration analysis of a machine foundation-general design criteria for machine foundations- Design criteria for foundation for reciprocating machines(only IS specifications) -vibration isolation and control

Module 3 (12 hrs)

Sheet Pile walls and Cofferdams: types and uses of sheet piles-design of cantilever sheet pile walls in granular and cohesive soils-anchored bulkhead-free earth support and fixed earth support method-coffer dams-uses- braced and cellular cofferdams

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Module 4 (12 hrs)

Special Foundations: Foundation for special structures such as water tanks, silos, cooling towers, guyed structures, ground storage tanks, chimneys, telecommunication towers, transmission line towers-foundation for under ground conduits- foundation for coastal and offshore structures-pre-stressed foundations. Shell Foundations-structural form and efficiency-different types.

Module 5 (12 hrs)

Foundations in Special soils: Foundation in expansive soil, soft and compressible soils, problems associated with foundation installation- ground water lowering and drainage- shoring and underpinning-different methods-damage and vibrations due to constructional operations

References

1. Bowles.J.E, Foundation Analysis and DesignMc Graw Hill Publishing Company.
2. N.P.Kurian, Modern foundations Tata Mc Graw Hill Publishing company
3. Srinivasulu P, Vaidyanathan C.V Handbook of Machine foundations
4. 11Teng W.C., *Foundation Design*, PHI
5 . P.C.Varghese, Foundation Engineering,Prentice-Hall of India Private Ltd, New Delhi
6 . Shashi K. Gulhati and Manoj Dutta, Geotechnical Engineering, Tata McGraw-Hill P ublishing Compay Limited,New Delhi.
7. Leonards G.A., *Foundation Engineering*, McGraw Hill
8 Arora K.R., *Soil Mechanics & Foundation Engg.,* Standard Publications
9 Punmia B. C., *Soil Mechanics & Foundations*, Laxmi Publications
10. Venkatramiah, *Geotechnical Engineering*, New Age International Publishers
11 Teng W.C., *Foundation Design*, PHI
12. Tomlinson M.J., *Foundation Design & Construction*, Pitman
13 .Coduto, *Geotechnical Engineering Principles and Practices*, Pearson Education

CE010 804L02 ENVIRONMENTAL GEOTECHNIQUES (Elective III)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective:

Waste disposal is a major issue for which we need different effective and innovative methods. The objective is to familiarise the students, the different types of wastes generated , composition of the wastes, and the problems they pose on environment due to improper disposal. It also includes the different effective methods for the disposal for the different types of wastes.

Module 1 (12 hours)

Clay mineralogy and soil structure: Gravitational and surface forces-inter sheet and inter layer bonding in the clay minerals- Basic structural units of clay minerals- isomorphous substitution – kaolinite mineral- montmorillonite mineral -illite mineral- electric charges on clay minerals – base exchange capacity ,diffused double layer- adsorbed water- soil structure- methods for the identification of minerals (introduction only).

Module 2 (15 hours)

Effect of environment on Geotechnical properties of soils: Effect of drying on Atterberg limits.-Volume change behaviour- factors controlling resistance to volume change- general relationship between soil type, pressure and void ratio.- importance of mineralogical composition in soil expansion. Activity- sensitivity ,causes of sensitivity-Influence of exchangeable cations , pH and organic matter on properties of soils. Permeability of soils- hydraulic conductivity of different types of soils – Darcy' s law and its validity- factors affecting permeability

Module 3 (10hours)

Wastes and Contaminants (introduction only): sources of wastes-types of wastes composition of different wastes- characteristics and classification of hazardous wastes- generation rates- ground water contamination- sources of ground water contamination- transport mechanisms-potential problems in soils due to contaminants.

Module 4 (12 hours)

Disposal and containment technics: Criteria for selection of sites for waste disposal- hydrological aspects of selection of waste disposal sites- disposal facilities- subsurface disposal technics-disposal systems for typical wastes (sketches only)

Module 5 (12 hours)

Containment control systems-Liners and covers for waste disposal- rigid liners, flexible liners. Ground modification technics in waste management – waste modification- ground modification- mechanical modification-hydraulic modification- chemical modification.

References

1. Mitchell, J (1976), " Fundamentals of soil behaviour", John Wiley and sons, NewYork
2. Lambe, T. W & Whitman, R. V (1979), " Soil Mechanics ", John Wiley and Sons, New York.
3. Gopal Ranjan & A.S.R Rao (1991), " Basic and Applied Soil Mechanics, Wiley Eastern Ltd., New Delhi.
4. Wilson, M. J (1987), " A Hand book of Determinative methods in Clay Mineralogy", Chapman and Hall, New York.
5. Robert M. Koerner (1984), "Construction and Geotechnical methods in Foundation Engineering", McGraw Hill Book Co., New York.

CE010 804L03 EARTHQUAKE ENGINEERING AND DESIGN (Elective III)

Teaching scheme: **Credit: 4**
2 hours lecture and 2 hours tutorial per week

Objective: *To have a general awareness about effects of earthquake and study of seismic design of structures.*

Module 1 (9 hrs)
Causes of Earthquakes: The earth and its interior, the circulations, plate tectonics. Types of earthquakes.
Seismic waves, measuring instruments, locating focus of earthquakes from wave velocity strong ground motions, characteristics of strong ground motion, magnitude, intensity and energy release. Direct and indirect effects of earthquake.

Module 2 (8 hrs)
Past earthquakes in India, basic geography and tectonic features of India, seismic zones of India.
Inertia forces in structures, flow of inertia, forces to foundations, effect of deformation in structures.
Building forms for earthquake resistance, Architectural features, size of buildings, horizontal and vertical layout of buildings.

Module 3 (14 hrs)

Torsion in buildings, Rigid and flexible floor diaphragm, Torsionally coupled and uncoupled system, earth design philosophy. importance of ductility, capacity design concept-Strong column weak beam concept, weak storey, flexibility of long and short period structures.

Module 4 (16 hrs)

Equivalent static lateral earthquake force analysis based on IS: 1893-2002, capacity design and detailing of R.C. building.
Flexible and rigid floors. Role of shear wall, load distribution among shear walls.

Module 5 (13 hrs)

Behaviour of brick masonary walls, Box action of masonary buildings, role of horizontal and vertical bands, retrofitting techniques of R.C.C. and masonry Buildings.

References
1. Earthquake resistant design of structures, P. Agarwal and. **M.**Shrikande, PHI Learning Pvt. Ltd., New Delhi
2. Earthquake resistant Design of structures, S.K. Duggal, Oxford University Press, New Delhi

3. Geo technical Earthquake Engineering, S. L. Kramer, Pearson Education.
4. Earthquake Tips, C. V. R. Murthy, BMTPC, New Delhi
5. Bureau of Indian Standards
   I S: 1893(Part I 2002)
   I S: 113920-1993
   I S: 13935-1993
   I S: 13828 -1993
6. Earthquakes, Bruce A. Bolt, W. H. Freeman & Company
7. Basic Geotechnical Earthquake Engineering. Dr.Kamalesh Kumar, New age International Pvt. Ltd.l

CE 010 804L04 ADVANCED HYDROLOGY AND SYSTEM ANALYSIS
(Elective -III)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective: *To increase knowledge on the application of advanced hydrologic methods to water resources problems. Hydrologic analysis emphasizes computational methods in hydrology for specific tasks. The level of understanding should, upon completion of the course, be sufficient to understand and appreciate the important issues in the current literature where statistical and optimization methods are used in prediction and interpretation of hydrologic processes.*

Module 1 (10hrs)

Introduction: Hydrologic cycle- Weather and hydrology: Thermal circulation - effects of earth's rotation - effect of' land and water distribution - migratory systems - fronts - measurement of temperatures –- geographic distribution of temperatures - time variations of temperatures - properties of water vapour- Measurement of humidity – geographic distributions of humidity - time variations in humidity-geographic variations of wind - time variations of wind - scanning and predicting weather.

Module 2 (10 hrs)

Precipitation: Measurement of precipitation- recording gauges - automatic gauges radars - estimation of missing data and adjustment of records - mean areal depth of precipitation - rain gauge network- design principles-depth area duration curves – Hyetograph, hydrograph and mass curve of rainfall - analysis of rainfall data - moving average curves - design storms – probable maximum precipitation curves snowfall and measurement. Determination of snow melts. Water Losses: Evaporation-evaporation pans – evapometre, control of' reservoir evaporation - soil evaporation - transpiration - estimation of evapo transpiration - infiltration - infiltration curves - determination of infiltration indices - water shed leakage - water balance.

Module 3 (10 hrs)

Runoff: Catchments characteristics - classification of streams- run off estimation by empirical formulae, curves, infiltration method, rational method, overland flow hydrograph and unit hydrograph method.

Hydrographs**:** Separation of stream, flow components - - unit hydrograph - assumption - derivations of unit hydrograph - unit hydrograph of complex storms - instantaneous unit hydrograph - synthetic unit hydrograph-applications.

Module 4 (15hrs)

Floods: Definition of standard project flood –Frequency analysis- maximum probable flood – probable maximum precipitation and design flood - estimation of peak flood-flood control. Measures - flood forecasting techniques- flood routing - analytical and graphical methods of flood routing. The erosion process - factors controlling erosion - reservoir sedimentation - control of reservoir sedimentation.

Module 5 (12 hrs)

System analysis: Basic system analysis concepts, scope and steps in system engineering-system approach-need for system approach-concept of models-classification of models-General system model, Descriptive vs Predictive, Single vs Multiple events and Stochastic vs Deterministic Models-simulation models- applications

Probability analysis of hydrological data**:** mean, median, mode, mean-deviation, standard deviation, variances and skewness of data normal, gamma, poisons, log normal and pears and type III distributions - flood, frequency by fuller's, Gumbel's, Powel and Ven Te chow methods.

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References

1. H. M.Reghunath, Hydrology, Wiley Easten Ltd., New Delhi.
2. Santhosh Kumar Garg, Hydrology and flood control engineering, Khanna Publishers.
3. R.K. Linsley, M. A. Kholar, Hydrology for engineers, Tata Mc Graw Hill.
4. Ven Te Chow, Maidment, D. R., and Mays, L. W., Applied Hydrology, McGraw-Hill, 1988.
5. Vijay P. Singh, Elementary Hydrology, Prentice Hall, 1992.
6. Viessman and lewis, introduction to hydrology, Harper Collin college publisher, 1996
7. Nathabandu T. Kottegoda and Renzo Rosso, Statistics, Probability, and Reliability for Civil and Environmental Engineers, The McGraw-Hill Companies, Inc., 1997.
8. Alfredo H.S. Ang and Wilson H. Tang, Probability Concepts in Engineering Planning and Design Vol. I Basic Principles and Vol. II Decision, Risks and Reliability, Wiley, 1975.
9. D.R. Helsel and R.M. Hirsch, Statistical Methods in Water Resources, USGS, 2002, http://pubs.usgs.gov/twri/twri4a3/.
10. C. T. Hann, Statistical Methods in Hydrology, The Iowa State University Press, 1977.
11. George P. Box and Gwilym M. Jenkins, Time Series Analysis: Forecasting and Control, Holden Day, 1976.

CEO10 804L05 HIGHWAY AND AIRFIELD PAVEMENTS (Elective III)

Teaching scheme: **Credit: 4**
2 hours lecture and 2 hours tutorial per week

Objective:
To equip the students to carry out design and evaluation of flexible and rigid pavements in varied field conditions.

Module 1 (12hrs)
Pavement types: stress distribution in pavements - theoretical subgrade conditions and traffic loadings Basic difference between flexible and rigid pavements - design factors - wheel load - equivalent single wheel load - repetition of loads - elastic modulii - climatic variations.

Module 2 (12hrs)
Design of flexible pavements: group index method - CBR method - IRC recommendations - Me Load method - Burmister's layer theory.

Module 3 (12hrs)
Design of rigid pavements: radius of relative stiffness - critical load positions - Westergaard's stress equation - Bradley's stress coefficients - design charts.

Module 4 (12hrs)
Temperature stresses in concrete pavements: Westergaard's concept - wrapping stress - functional stress - combination of stresses.
Design of joints in concrete pavements: expansion joints - construction joints - design of dowel bars - tie bars - IRC recommendation.

Module 5 (12hrs)
Evaluation of pavement condition: pavement instrumentation - types of pavement distress - roughness and skid resistance. Environmental influence and effects-pavements maintenance and overlays.

References
1. Bindra B.S, Highway Engineering, Danpat Rai and Sons.
2. H.J.Yoder, Principles of Pavement Design, John wiley and sons
3. Khanna O.P, Justo C.G., Highway Engineering, Nem Chand Publishers
4. IRC Standard specifications for Construction of Flexible and rigid pavements

CE010 804 L06 STRUCTURAL DYNAMICS AND STABILITY ANALYSIS

(Elective III)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective:

To study 1. the basic concepts of stability.

2.the comprehensive methods of dynamic analysis.

Module 1 (12 hours)

Introduction-problems in nature-steady state problem-dynamic problem-stability problem (Eigen value problem)-introduction to dynamic loading-D'Alembert' s equation of equilibrium-inertia force-effect of damping-Hamilton' s principle.

Module 2 (12 hours)

Single degree of freedom system-idealisation-free vibration-natural frequencyresonance-forced vibration-lumped mass-consistent mass.

solution techniques-determinant search procedure-Householders method

Module 3 (12 hours)

Introduction to stability analysis-energy principles-stable, unstable and neutral equilibrium-fourth order differential equation for generalized bending problemselastic instability of columns-Euler' s theory-assumptions-limitations. General treatment of column stability problem as an Eigen value problem-various modes of failure for various end conditions- both ends hinged-both ends fixed-one end fixed other end free- one end fixed other end hinged

Module 4 (13 hours)

Beam column-beam column equation-solution of differential equation for various lateral loads-udl and concentrated loads-solutions for various end conditions-both ends hinged-both ends fixed-one end fixed other end free- one end fixed other end hinged.

Module 5 (11 hours)

Finite element application to dynamics-element stiffness matrix and mass matrix of a beam element. Finite element application to stability analysis- finite element stability analysis-element stiffness matrix –geometric stiffness matrix-derivation of element stiffness matrix and geometric stiffness matrix for a beam element.

References

1. Ray W Clough, Joseph Penzien, Dynamics of structures, Mc Graw Hill,Kogabusha Ltd.
2. Ziegler H, Principles of structural stability, Blarsdell, Wallham, Mass, 1963.
3. Thompson J M, G W Hunt, General stability of elastic stability, Wiley, NewYork.
4. Timoshenko, Gere, Theory of elastic stability, Mc Graw Hill, New York.
5. Don O Brush, B O O Almorth, Buckling of Bars, plates and shells,
6. Cox H L, The buckling of plates and shells, Macmillam, New York, 1963.
7. O C Zienkiewicz ,.Finite Element Method ,fourth Edition,McGraw Hill,
8. R.D.Cook, Concepts and Applications of Finite Element Analysis, John Wiley&Sons.

CE010 805G01 FINITE ELEMENT ANALYSIS (Elective IV)

Teaching scheme: **Credit: 4**
2 hours lecture and 2 hours tutorial per week

Objective:
To make the back ground, basic concepts and basic formulation of finite element method

Module I (12hrs)
Introduction to FEM-Historical development-Idealization of actual structures-Mathematical model-General procedure of FEA-Displacement approach. Solution techniques- Gauss Elimination – Frontal solver (concepts only)

Module 2 (12hrs)
Finite element analysis- -Energy principles- Principle of Stationary Potential Energy- Complementary Energy - Variational approach -Stable- Unstable-Neutral equilibrium-Virtual work- Principle of virtual forces – Principle of virtual displacements.

Module 3 (12hrs)
Shape functions-Lagrangian and Hermition Interpolation – Polynomials – General coordinates-Area coordinates-Compatibility –C_0 and C_1 elements-convergence criteria- conforming & nonconforming elements – Patch test

Module 4 (12hrs)
Stiffness matrix-Bar element-Beam element-Triangular elements - Constant Strain Triangle-Linear Strain Triangle- Isoparametric elements-Numerical Integration - Gauss Quadrature.

Module 5 (12hrs)
General plate bending elements- Plate bending theory – Kirchhoff's theory – Mindlin's theory – Introduction to locking problems- preventive measures – reduced integration – selective integration. Axysymmetric elements- Introduction to shell elements

References

1. O C Zienkiewicz,.Finite Element Method, fourth Edition,McGraw Hill,
2. R.D.Cook, Concepts and Applications of Finite Element Analysis, John Wiley &Sons.
3. Stephen P.Timoshenko& Krieger, S.W., Theory of Plates and Shells, McGraw Hill.
4. C.S.Krishnamoorthy, Finite Element Analysis, Tata McGraw Hill .New Delhi, 1987.
5. S.Rajasekharan, Finite Element Analysis, Wheeler Publishing Co., &Sons.1993.
6. T.Kant, Finite Element Methods in Computational Mechanics, Pergamons Press.
7. K.J.Bathe, Finite Element Procedures in Engineering Analysis, Prentice Hall,
8. Mukhopadhyay M., Matrix Finite Element Computer and Structural Analysis,

Oxford &IBH, 1984.
9. Irving H.Shames, Energy &Finite Element Methods in Structural Mechanics.
10. Desai C.S.&Abel J.F., Introduction to Finite Element Methods, East West Press

CE010 805G02 ENVIRONMENTAL POLLUTION CONTROL TECHNIQUES (ELECTIVE IV)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective:

- *To understand the basic concept of various forms of Environmental Pollution*
- *To develop knowledge in control techniques for Environmental Pollution*

Module 1 (12hrs)

Introduction to environmental pollution

Air pollution – Sources – Criteria pollutants – Control of gaseous pollutants (adsorption, absorption, reaction and other methods) – Control of particulate pollutants (settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators)– Automobile pollution control

Module 2 (12hrs)

Water pollution – Sources – Various Pollutants – Treatment and control methods – Physico-chemical and Biological Treatments – Screening, skimming, sedimentation, coagulation, Filtration, Trickling Filters, Activated sludge process, Oxidation ponds, high rate anaerobic methods (design not needed)

Module 3 (12hrs)

Industrial Pollution - Characteristics of industrial wastes**:** physical, chemical and biological. Pretreatment of industrial wastes**:** waste volume reduction, waste strength reduction - neutralization, equalization and proportioning.

Theories of treatments processes**:** sedimentation flotation coagulation - evaporation & ion exchange – lagooning - activated sludge treatment - High rate anaerobic treatment.

Module 4 (12hrs)

Solid waste management: Type and source of solid waste, characteristics, collection, transportation and processing- Waste minimization strategies – Reduction - Recycling – Reuse – Disposal - composting, sanitary landfill, incineration, .

Module 5 (12hrs)

Noise pollution: Sources, effects of noise pollution, control measures.

Administrative and Legislative control of environmental pollution. Important Environmental rules and regulations, environmental protection laws and acts.

References

1. Peavy, Rowe, Tchobanoglous, Environmental Engineering, Mc Graw Hill International Editions.
2. M.N. Rao & H.V.N. Rao, Air Pollution, Tata Mc Graw Hill Pvt. Ltd., New Delhi.
3. S. K. Garg, Environmental Engineering Vol. l & ll, Khanna Publishers, New Delhi.
4. B.C. Punmia, Water supply Engineering, Arihant Publications, Jodpur.
5. B.C. Punmia, Waste water Engineering, Arihant Publications, Jodpur.
6. Nelson Leonard Nemerow, Theories and practices of industrial waste treatment, Addison-Wesley Publishing Co., Inc.

7. W Wesley Eckenfelder Jr., Industrial water pollution control, International Edition, Mc Graw Hill Inc, New Delhi.
8. M Narayana Rao, Waste water treatment, Rational methods of design and Industrial practice, Oxford & IBH Publishing Co. Pvt. Ltd, Bombay.
9. C.S. Rao, Environmental Pollution Control Engineering, New Age International (P)Ltd, New Delhi.
10. Warren Viessman and mark J Hammer, Water Supply and Pollution Control, Pearson Education, Inc.
11. Gilbert M.Masters, Kurian Joseph and R. Nagendran, Introduction to Environmental Engineering and Science.
12. Ruth F. Weiner and Robin Matthews, Environmental Engineering, Butterworth-Heinemann, Elsevier.

CE010 805G03 OPTIMIZATION TECHNIQUES (Elective IV)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective:

To make the students aware of scientific methods and techniques to decision making problems and provides the best optimal solutions.

Module 1 (12hrs)
Classical optimization techniques
Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method - Multivariable optimization with inequality constraints – Kuhn-Tucker conditions.

Module 2 (12hrs)
One-dimensional unconstrained minimization
Elimination methods – unrestricted search method – Fibonacci method – Interpolation methods – Quadratic interpolation and cubic interpolation methods.

Module 3 (12hrs)
Unconstrained minimization
Gradient of a function – Steepest descent method – Newton's method – Powells method – Hooke and Jeeve's method.

Module 4 (12hrs)
Integer – Linear programming problem
Gomory' s cutting plane method – Gomory' s method for all integer programming problems, mixed integer programming problems**.**

Module 5 (12hrs)
Network Techniques
Shortest path model – Dijkstra`s Algorithm – Floyd`s Algorithm – minimum spanning tree problem – PRIM algorithm – Maximal Flow Problem algorithm.

References

1. S.S. Rao, Optimization theory and application, New Age International P. Ltd.
2. A.D. Belegundu, T.R. Chandrupatla, Optimization Concepts and applications in Engineering, Pearson Education Asia.
3. F. S. Budnick, D. McLeavey, R. Mojena, Richard D, Principles of Operations Research for Management, Irwin, INC.
4. H. A. Taha, Operation Research an introduction, Eastern Economy Edition.
5. R. Panneerselvam, Operations Research, PHI.

CE010 805G04 LAND USE PLANNING (Elective IV)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objectives:

The basic objective of this course is to introduce to the students of planning the various theories of planning and city design along with necessary details in terms of population projection, formulation of activity structure, formulation of goals and objectives for any planning work to be carried out. This course is also aimed at students getting enough theoretical background to carry concurrent laboratory exercise in area planning and city planning. Attempt has been made to include several case studies and relate them to the theories of planning to develop better understanding of urban planning.

Module 1 (10 Hrs)

Introduction: Brief Study of Urban Travel Patterns and Urban Transportation Technologies; Land use-Transportation Planning Process

Module 2 (13 Hrs)

Urban Forms and Urban Structure: Hierarchy of Urban Activity System, Hierarchy of Urban Transportation Network and Technology; Relationship between Movement and Accessibility Functions of Transportation Network; Urban Structure and its Characteristics such as Centripetal, Grid Iron, Linear and Directional Grid types, Study of Urban Forms such as Garden City, Precincts, Neighbourhoods, Linear City, MARS Plan, LeCorbusier Concept, Radburn Concept, Environmental Area Concept.

Module 3 (13 Hrs)

Demographic and Employment Forecasting Models: Demographic Models- Linear, Exponential and Logistic Models,; Cohort Survival Models-Birth, Aging and Migration Models; Employment Forecasting Models- Economic base Mechanism; Population and Employment Multiplier Models- Input and Output Models - Dynamic Models of Population and Employment

Module 4 (12 Hrs)

Land use-Transportation Models: Lowry based Land use-Transportation Models – Allocation Function, Constraints, Travel Demand Estimation – Iterative Solutions, Matrix Formulation

Module 5 (12 Hrs)

Evaluation of Land use – Transportation Plans: Operational, Environmental and Economic Evaluation – Concept of Demand and Supply for Transportation Projects – Benefit and Cost – B/C and Cost Effective Approach for Economic Evaluation.

References

1) Hutchinson B.G., Principle of Transportation Systems Planning, McGraw-Hill.
2) Oppenheim N., Applied Models in Urban and Regional Analysis, Prentice-Hall.
3) Dickey J.W., *et. al*., Metropolitan Transportation Planning, Tata McGraw-Hill.
4) Gallion A.B and Eisner S., The Urban Pattern, Affluated East-West Press, New Delhi.
5) Heggei, I.G., Transportation Engineering Economics, Mc-Graw Hill Book Company, New York.
6) Wilson, A.G, Urban and Regional Models in Geography and Planning, John Wiley and Sons.

CE 010 805G05 NUMERICAL METHODS (Elective IV)

Teaching scheme: **Credit: 4**

2 hours lecture and 2 hours tutorial per week

Objective

To impart the basic concepts of mathematical modeling of problems in science and engineering and to know procedures for solving different kinds of problems.

To understand the various numerical techniques which provide solutions to non linear equations, partial differential equations etc that describe the mathematical models of problems.

Module I (10 hours)

Solution of linear equations:- Review of Gaussian elimination and Cholesky methods- storage schemes – substructure concept- sub matrix equation solver

Module 2 (12 hours)

Solution technique for Eigen value problem:- Introduction – forward iteration, inverse iteration, Jacobi's method

Module 3 (13 hours)

Numerical Interpolation& Integration – Introduction – Lagrange, Hermitian and isoparametric style of interpolation. Numerical integration - trapezoidal rule - Simpson 1/3 rule - Simpson 3/8 rule - Gauss quadrature formula – weights and Gauss points

Module 4 (12 hours)

Finite difference techniques:-Finite difference method, ,Newton's method, Variational and weighted residual methods

Module 5 (13 hours)

Statistical Computations - frequency Chart - method of least square curve fitting procedures - fitting a straight line - curve fitting by sum of exponential - data fitting with cubic splines - approximation of functions. Regression Analysis - linear regression

References

1. Balagurusamy E , *Numerical Methods*, Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.
2. Gerald C.F. and Wheatley P.O., *Applied Numerical Analysis, 6th Ed.*, Pearson Education Asia, New Delhi, 2002.
3. Rajasekharan S, Numerical Methods in Science and Engineering, A practical Approach, A.H. Wheeler &Co
4. K.J. Bathe, Finite Element Procedures in Engineering Analysis, Prentice Hall,
5. Jain M.K., Iyengar S.R.K. &Jain R.K, Numerical Methods for Science and Engineering, Prentice Hall of India
6. Saumyen Guha& Rajesh Srivastava, Numerical Methods for Engineering and Science, Oxford University Press.

CE010 805G06 REMOTE SENSING AND GIS APPLICATIONS (Elective IV)

Teaching scheme **Credit: 4**

2 hours lecture and 2 hours tutorial per week.

Objective

To make the students aware of the technological developments in the geographical database management and its advantages.

Module 1 (13hours)

Remote sensing: definition- components of remote sensing- energy sensor, interacting body- active and passive remote sensing- platforms- Arial and space platforms- balloons, helicopters, aircrafts and satellites- electromagnetic radiation(EMR)- EMR spectrum- visible, infrared(IR) ,near IR, middle IR, thermal IR and microwave- black body radiation- Plancks Law- Stefan-Boltzman law.

Module 2 (12hours)

Atmospheric characteristics- scattering of EMR- Raliegh, Mie, Non-selective and Raman scattering- EMR interaction with water vapour and ozone- atmospheric windows- significance of atmospheric windows- EMR interaction with earth surface material, radiance, irradiance, incident, reflected, absorbed and transmitted energy- reflectance- specular and diffused reflection surfaces- spectral signature- spectral signature curves- EMR interaction with water, soil and earth surface.

Module 3 (12hours)

Optical and Microwave Remote sensing:

Satellites- classification- based on orbits- sun synchronous and geo synchronous- based on purpose- earth resources satellites, communication satellites, weather satellites, spy satellites- satellite sensors- resolution- spectral, spatial, radiometric and temporal resolution- description of multi-spectral scanning- along and across track scanners- description of sensors in IRS series- current satellites- radar- speckle- back scattering- side looking air borne radar- synthetic aperture radar- radiometer radar- geometrical characteristics. Principles of thermal remote sensing- Principles of microwave remote sensing.

Module 4 (12hours)

Geographic information system- components of GIS- hardware, software and organizational context- data- spatial and non spatial maps- types of maps- projection- types of projection- data input- digitizer, scanner, editing- raster and vector data structures- comparison of raster and vector data structure- analysis using raster and vector data- retrieval, reclassification, overlaying, buffering- data output- printers and plotters.

Module 5 (12hours)

Miscellaneous topics: interpretation of satellite images- elements of interpretation- visual interpretation- digital image processing techniques- image enhancement- filtering- image classification- FCC composites- supervised and unsupervised integration of GIS and remote sensing- application of remote sensing and GIS- urban applications- water resources- urban analysis- watershed management- resources information system- hazard mitigation.

References:

1. Thomas M.Lillesand &Raiph W.Kiefer,"remote sensing and image interpretation",John Wiley Sons.
2. Floyd F. Sabins, "Remote sensing principles and interpretation", Freeman And Company.
3. Anji Reddy,"Remote sensing and geographical systems",BS Publications.
4. M.G.Srinivas (Edited by),"Remote Sensing Applications", Nerusa publications.
5. Jensan J.R.,"Introductory Digital Image Processing",Prentice Hall of India.

CE010 806 ENVIRONMENTAL ENGINEERING LAB

Teaching scheme **Credits: 2**

3 hours practical per week

Objective:

To make students familiar with laboratory tests for water and waste water quality assessment.

List of Experiments

1. Determination of alkalinity of water.
2. Determination of hardness of water.
3. Determination of acidity of water.
4. Determination of iron.
5. Determination of sulphates.
6. Determination of Chlorine demand and residual chlorine.
7. Determination of chlorides in water.
8. M. P. N. of Fecal coliforms using A-l medium
9. D.O. and Biochemical Oxygen Demand.
10. Chemical oxygen demand.
11. Determination of solids - total, suspended, dissolved, fixed, volatile, settleable and SVI.
12. Determination of Turbidity and estimation of optimum coagulant dosage by jar test.
13. Determination of pH

Reference:

1. "Standard methods for the examination of water and wastewater" 1995, ALPHA, AWWA, WPCF Publication.
2. "Chemistry for Environmental Engineering"- Sawer and McCarty, McGraw Hill.
3. "Manual of standards of quality for Drinking Water Supplies"- Indian Council of Medical Research, New Delhi.
4. "International Standards of Drinking Water" – W.H.O.
5. "IS 2490-1981, IS 3306- 1974, IS 3307-1977, IS 7968-1976, IS 2296-1974, IS 10500-1991" Bureau of Indian Standards, New Delhi, Effluent Standard KSPCB.

CE010 807 Project Work

Teaching scheme **credits: 4**

6 hours practical per week

The progress in the project work is to be presented by the middle of eighth semester before the evaluation committee. By this time, the students will be in a position to publish a paper in international/ national journals/conferences. The EC can accept, accept with modification, and request a resubmission.

The progress of project work is found unsatisfactory by the EC during the middle of the eighth semester presentation, such students has to present again to the EC at the end of the semester and if it is also found unsatisfactory an extension of the project work can be given to the students.

Project report: To be prepared in proper format decided by the concerned department. The report shall record all aspects of the work, highlighting all the problems faced and the approach/method employed to solve such problems. Members of a project group shall prepare and submit **separate** reports. Report of each member shall give details of the work carried out by him/her, and only summarise other members' work.

The student's sessional marks for project will be out of 100, in which 60 marks will be based on day to day performance assessed by the guide. Balance 40 marks will be awarded based on the presentation of the project by the students before an evaluation committee.

For Project, the minimum for a pass shall be 50% of the total marks assigned to the Project work.

CE010 808 Viva -Voce

Teaching scheme **credits: 2**

A comprehensive oral Viva-voce examination will be conducted to assess the student's intellectual achievement, depth of understanding in the specified field of engineering and papers published / accepted for publication etc. At the time of viva-voce, certified bound reports of seminar and project work are to be presented for evaluation. The certified bound report(s) of educational tour/industrial training/ industrial visit shall also be brought during the final Viva-Voce.

An internal and external examiner is appointed by the University for the Conduct of viva voce University examination.

For Viva-voce, the minimum for a pass shall be 50% of the total marks assigned to the Viva-voce.

Note: If a candidate has passed all examinations of B.Tech. course (at the time of publication of results of eighth semester) except Viva-Voce in the eighth semester, a re-examination for the Viva-Voce should be conducted within one month after the publication of results. Each candidate should apply for this 'Save a Semester examination' within one week after the publication of eighth semester results.