St. PETER'S INSTITUTE OF HIGHER EDUCATION AND RESEARCH

IGNITE • INSPIRE • INNOVATE

(Deemed to be University U/S 3 of the UGC Act, 1956)

B.E. (CIVIL ENGINEERING)

(Approved by AICTE)

(I to VIII SEMESTERS)

CURRICULUM AND SYLLABI UNDER

CHOICE BASED CREDIT SYSTEM

(REGULATION – 2020)

Effective from the Academic Year 2020-2021

VISION & MISSION OF THE INSTITUTION

Vision

To achieve, Academic Excellence in Engineering, Technology and Science through Teaching, Research and Extension to Society

Mission

By generating, preserving and disseminating knowledge through rigorous academic study, inquisitiveness to understand and explore nature, entrepreneurship with creativity and innovation

VISION & MISSION OF THE DEPARTMENT

Vision

To mould our students as eminent civil engineers with excellent knowledge and skills leading to attitudinal transformation for national development.

Mission

By developing technically competent technocrats by imparting sound theoretical and practical knowledge through innovative teaching and learning process to meet the global challenges.

Program Educational Objectives (PEOs)

Bachelor of Engineering Programme in Civil Engineering is designed to prepare the graduates

PEO1: As competent engineering professionals in academic, research and industrial domains with ethical and social responsibility.

PEO2: To educate the graduates with fundamental concepts, advanced techniques and modern tools that will enable them to design, develop and deploy solutions for real world problems and build systems of varying complexity.

PEO3: To prepare the students to review the existing literature in the area of specialization, provide innovative solutions scientifically and ethically by adapting to the new technology and communicate effectively in deliberating their duties as an individual or as a team.

PROGRAM OUTCOMES (POs):

Graduates of Civil Engineering will be able to

PO1: Engineering knowledge: able to apply knowledge of mathematics, science, and engineering

PO2: Problem analysis: able to design and conduct experiments, as well as to analyze and interpret data

PO3: Design/development of solutions: able to design solutions for complex civil 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.

PO4: Modern tool usage: able to use latest tools, techniques and softwares for engineering practice

PO5: Life-long learning: able to engage in up-to-date learning.

PO6: Individual and team work: able to function in multi-disciplinary teams

PO7: Ethics: a creative leader with ethical and professional responsibilities

PO8: Project management and finance: able to determine the financial aspects of a project with sufficient reliability make effective cost estimates and convey achievable timelines for his projects

PO9: Communication: able to achievable timelines for his projects as a confident individual with good communication skill.

Program Specific Outcomes (PSOs)

PSO 1: Analyze, design and execute all types of construction projects with optimized resources and within stipulated time.

PSO 2: Contribute infrastructure development of nation with professional ethics.

Contribution 1: Reasonable **2: Significant** **3: Strong**

St. PETER'S INSTITUTE OF HIGHER EDUCATION AND RESEARCH

B.E. (CIVIL ENGINEERING) PROGRAMME

REGULATIONS AND SYLLABI UNDER CHOICE BASED CREDIT SYSTEM

(Effective from the Academic Year 2020-2021)

B.E / B. Tech. REGULATIONS (2020)

Regulations – 2020 is applicable to the students admitted to the Degree of Bachelor of Engineering (B.E.), Bachelor of Technology (B.Tech.) (Eight Semesters) programme effective from the academic year 2020-2021

1. NOMENCLATURE

- **Programme** : Refers to the Bachelor of Engineering / Technology Stream that a student has chosen for study.
- **Course** : Refers to the course (Subject) that a student would have to undergo during the study in the Institution
- **Batch** : Refers to the Starting and Completion year of a Programme of study. Eg. Batch of 2020–2024 refers to students belonging to a 4 year Degree programme admitted in 2020 and completing in 2024.
- **Department** : Each Programme of the Institution is grouped under a Department. Eg. B.E Computer Science is grouped under Departments of Computer Science and Engineering. This Department offers various Undergraduate and Postgraduate Programmes in Engineering like B.E (Computer Science and Engineering), M.E (Computer Science and Engineering).
- **Dean** : Refers to the Head of Engineering Programmes.
- **HoD** : Refers to the Head of a Department (HoD) offering various UG and PG programmes.
  He/She will be the Head of all staff members and Students belonging to the Department

2. QUALIFICATION FOR ADMISSION

Qualification for admission will be as per the criterion specified by the appropriate agencies of the Government of India.

- Candidates who passed the Higher Secondary Examination with Mathematics, Physics and Chemistry conducted by the Government of Tamil Nadu or its equivalent in the relevant subjects as recognized by the Institute or any other equivalent Examination thereto and who appeared for the entrance test conducted by the University or approved institutions wherever prescribed are eligible for admission to Four Year B.E. Programme.
- Candidates who passed Three Year Diploma in Technical Education in the concerned subject conducted by the Government of Tamil Nadu are eligible for admission to the Second Year of Four Year B.E. Programme in the relevant discipline.

3. STRUCTURE OF PROGRAMME

Every Programme will have a curriculum with syllabi consisting of theory and practical.

Credit Distribution

S.No	Category	No. of Courses	Credits
1.	Institute Core Courses	23	57
2.	Institute Elective Courses	2	6
3.	Program Core Courses	29	89
4.	Program Elective Courses	6	18
Total		**60**	**170**

I Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	AELT1101	English	3	0	0	3	40	60	100
2	AMAT1101	Mathematics –I	3	1	0	4	40	60	100
3	ACYT1101	Chemistry	3	0	0	3	40	60	100
4	AEET1101	Basic Electrical and Electronics Engineering	3	0	0	3	40	60	100
5	AMET1101	Engineering Graphics& Design	1	0	4	3	40	60	100
6	ACYL1101	Chemistry Laboratory	0	0	4	2	40	60	100
7	AMEL1101	Engineering Practices Laboratory	0	0	4	2	40	60	100
	Total		**13**	**1**	**20**	**20**	**280**	**420**	**700**

II Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	AMAT1102	Mathematics –II	3	1	0	4	40	60	100
2	APHT1101	Physics	3	0	0	3	40	60	100
3	ACHT1101	Environmental Science	3	0	0	3	40	60	100
4	ACST1101	Computer Programming	3	0	0	3	40	60	100
5	ACIT1101	Engineering Mechanics	3	0	0	3	40	60	100
6	APHL1101	Physics Laboratory	0	0	4	2	40	60	100

7	ACSL1101	Computer Programming Laboratory	0	0	4	2	40	60	100
8	ASSL1101	Soft Skills Lab 1	0	0	2	1	100	--	100
		Total	**15**	**1**	**10**	**21**	**380**	**420**	**800**

III Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	AMAT2103	Mathematics - III	3	1	0	4	40	60	100
2	ACIT2101	Engineering Geology	3	0	0	3	40	60	100
3	ACIT2102	Strength of Materials I	3	1	0	4	40	60	100
4	ACIT2103	Construction Materials	3	0	0	3	40	60	100
5	ACIT2104	Fluid Mechanics and Machinery	3	1	0	4	40	60	100
6	ACIL2101	Strength of Materials Lab	0	0	4	2	40	60	100
7	ACIL2102	Construction Materials Lab	0	0	4	2	40	60	100
8	ACIL2103	Fluid Mechanics and Machinery Lab	0	0	4	2	40	60	100
9	ASSL2102	Soft Skills Lab 2	0	0	2	1	100	--	100
		Total	**15**	**3**	**14**	**26**	**420**	**480**	**900**

IV Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	ACIT2105	Construction Technology	3	0	0	3	40	60	100
2	ACIT2106	Strength of Materials II	3	1	0	4	40	60	100
3	ACIT2107	Surveying	3	0	0	3	40	60	100
4	ACIT2108	Water Supply Engineering	3	0	0	3	40	60	100
5	ACIT2109	Soil Mechanics	3	0	0	3	40	60	100
6	ACIL2104	Surveying Lab	0	0	4	2	40	60	100
7	ACIL2105	Soil Mechanics Lab	0	0	4	2	40	60	100
8	ACIL2106	Computer Aided Building Drawing Lab	0	0	4	2	40	60	100
9	ACII2101	Internship	0	0	4	2	40	60	100
10	ASSL2103	Soft Skills Lab 3	0	0	2	1	100	--	100
		Total	**15**	**1**	**18**	**25**	**460**	**540**	**1000**

V Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	ACIT3110	Structural Analysis I	3	1	0	4	40	60	100
2	ACIT3111	Foundation Engineering	3	0	0	3	40	60	100
3	ACIT3112	Waste Water Engineering	3	0	0	3	40	60	100
4	ACIT3113	Design of Reinforced Concrete Elements	3	1	0	4	40	60	100
5	ACIT3114	Water Resources and Irrigation Engineering	3	0	0	3	40	60	100
6		Program Elective I	3	0	0	3	40	60	100
7	ACIL3105	Water and Waste Water Engineering Lab	0	0	4	2	40	60	100
8	ACIL3106	Computer Aided Structural Drawing Lab	0	0	4	2	40	60	100
9	ASSL3104	Soft Skills 4	0	0	2	1	100	--	100
		Total	**15**	**2**	**10**	**25**	**420**	**480**	**900**

VI Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	ACIT3115	Structural Analysis II	3	1	0	4	40	60	100
2	ACIT3116	Design of Steel Structural Elements	3	1	0	4	40	60	100
3	ACIT3117	Transportation Engineering	3	0	0	3	40	60	100
4		Institute Elective-I (from other departments):	3	0	0	3	40	60	100
5		Program Elective II	3	0	0	3	40	60	100
6	ACIL3108	Transportation Engineering Laboratory	0	0	4	2	40	60	100
7	ACII3101	Internship	0	0	4	2	40	60	100
8	ASSL3105	Soft Skills 5	0	0	2	1	100	--	100
		Total	**15**	**2**	**10**	**22**	**380**	**420**	**800**

VII Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1	AMBT1101	Principles of Management and Professional Ethics	3	0	0	3	40	60	100

2	ACIT4118	Estimation and Quantity Surveying	3	0	0	3	40	60	100
3		Program Elective III	3	0	0	3	40	60	100
4		Program Elective IV	3	0	0	3	40	60	100
5		Institute Elective II	3	0	0	3	40	60	100
6	ACIP4109	Project Phase 1	0	0	6	3	40	60	100
		Total	**15**	**0**	**6**	**18**	**240**	**360**	**600**

VIII Semester

Sl.No.	Code No.	Course Title	L	T	P	Credit	Marks		
							CA	EA	Total
1		Professional Elective V	3	0	0	3	40	60	100
2		Professional Elective VI	3	0	0	3	40	60	100
3	ACIP4110	Project Phase II	0	0	14	7	40	60	100
		Total	**6**	**0**	**14**	**13**	**120**	**180**	**300**

TOTAL CREDITS: 170

(i) **Institute Core Courses (IC)** which includes General Foundation courses comprising English, Mathematics, Basic Sciences and Engineering Sciences along with Laboratories.

Institute Core Applicable to Department of Civil Engineering				
Sl.No.	**Course Code**	**Course Title**	**No. of Courses**	**No. of Credits**
1	AMAT1101	Mathematics I	1	4
2	AMAT1102	Mathematics II	1	4
3	AMAT2103	Mathematics III	1	4
4	APHT1101	Physics	1	3
5	APHL1101	Physics Lab	1	2
6	ACYT1101	Chemistry	1	3
7	ACYL1101	Chemistry Lab	1	2
8	AELT1101	English	1	3
9	ACHT1101	Environmental Science	1	3
10	AMET1101	Engineering Graphics & Design	1	4
11	AMEL1101	Engineering Practice	1	2
12	AEET1101	Basic Electrical and Electronics	1	3
13	ACST1101	Computer Programming	1	3
14	ACSL1101	Computer Programming Lab	1	2
15	ACIT1101	Engineering Mechanics	1	3
16	AMBT1101	Principles of Management & Professional Ethics	1	3
17		Soft Skills Lab 1	1	1
18		Soft Skills Lab 2	1	1

19		Soft Skills Lab 3	1	1
20		Soft Skills Lab 4	1	1
21		Soft Skills Lab 5	1	1
22	ACII2101	Internship	1	2
23	ACII3101	Internship	1	2
		Total	23	57

(ii)**Programme Core courses (PC)** belonging to the Major Programme of study.

Programme Core Courses

Sl.No.	Course Code	Course Title	Prerequisite Courses	No. of Credits
1.	ACIT1101	Enigneering Mechanics	APHT1101	3
2.	ACIT2101	Engineering Geology	Nil	3
3.	ACIT2102	Strength of Materials I	ACIT1101	4
4.	ACIT2103	Construction Materials	Nil	3
5.	ACIT2104	Fluid Mechanics and Machinery	APHT1101	4
6.	ACIL2101	Strength of Materials Lab	ACIT2102	2
7.	ACIL2102	Construction Materials Lab	ACIT2103	2
8.	ACIL2103	Fluid Mechanics and Machinery Lab	ACIT2104	2
9.	ACIT2105	Construction Technology	ACIT2103	3
10.	ACIT2106	Strength of Materials II	ACIT1101 ACIT2102	4
11.	ACIT2107	Surveying	Nil	3
12.	ACIT2108	Water Supply Engineering	ACHT1101	3
13.	ACIT2109	Soil Mechanics	Nil	3
14.	ACIL2104	Surveying Lab	ACIT2107	2
15.	ACIL2105	Soil Mechancis Lab	ACIT2109	2
16.	ACIL2104	Computer Aided Building Drawing Lab	AMET1101	2
17.	ACIT3110	Structural Analysis I	ACIT 1101 ACIT 2102 ACIT 2106	4
18.	ACIT3111	Foundation Engineering	ACIT2109	3
19.	ACIT3112	Waste Water Engineering	ACIT2108	3
20.	ACIT3113	Design of Reinforced Concrete Elements	ACIT2102	4
21.	ACIT3114	Water Resources and Irrigation Engineering	Nil	3
22.	ACIL3105	Water and Waste Water Engineering Lab	ACIT2108 ACIT3112	2
23.	ACIL3106	Computer Aided Structural Drawing Lab	ACIL2104 ACIT3113	2
24.	ACIT3115	Structural Analysis II	ACIT3110	4
24.	ACIT3116	Design of Steel Structural Elements	ACIT1101 ACIT2102	4
25.	ACIT3117	Transportation Engineering	Nil	3
26	ACIL3108	Transportation Engineering Laboratory	ACIT3117	2
27	ACIT4118	Estimation and Quantity Surveying	ACIT2103 ACIT2105	3

			ACIT3113	
28.	ACIP4109	Project Phase1	1	3
29.	ACIP4101	Project Phase2	1	7
		TOTAL	**29**	**89**

(iii)**Programme Electives (PE)** offered by the Department related to the Major programme of study. A student should choose atleast 6 courses during the programme.

PROGRAM ELECTIVES

GROUP A : STRUCTURAL ENGINEERING

Code No.	Course Title	L	T	P	Credit	Marks		
						CA	EA	Total
ACIT3118	Advanced concrete structures	3	1	0	4	40	60	100
ACIT3119	Structural Dynamics and Earthquake Engineering	3	1	0	4	40	60	100
ACIT4119	Prestressed Concrete Structres	3	1	0	4	40	60	100
ACIT4120	Design of RC and Steel Storage Structures	3	1	0	4	40	60	100
ACIT4121	Tall Buildings	3	1	0	4	40	60	100
ACIT4122	Precast Concrete Structures	3	0	0	3	40	60	100
ACIT4123	Repair and Rehabilitation of Structures	3	0	0	3	40	60	100

GROUP B WATER RESOURCES ENGINEERING

Code No.	Course Title	L	T	P	Credit	Marks		
						CA	EA	Total
ACIT 3120	Total Station and GPS	3	0	0	3	40	60	100
ACIT 3121	Remote sensing Techniques and GIS	3	0	0	3	40	60	100
ACIT4124	Hydrology	3	0	0	3	40	60	100
ACIT4125	Ground Water Engineering	3	0	0	3	40	60	100
ACIT4126	Ground Improvement Techniques	3	0	0	3	40	60	100
ACIT4127	Design of Hydraulic Structures	3	1	0	4	40	60	100

GROUP C ENVIRONMENTAL ENGINEERING

Code No.	Course Title	L	T	P	Credit	Marks		
						CA	EA	Total
ACIT3122	Municipal Solid Waste Management	3	0	0	3	40	60	100
ACIT3123	Industrial Waste Management	3	0	0	3	40	60	100
ACIT4128	Air Pollution Management	3	0	0	3	40	60	100

ACIT4129	Environmental Impact Assessment	3	0	0	3	40	60	100

GROUP D TRANSPORTATION ENGINEERING

Code No.	Course Title	L	T	P	Credit	Marks		
						CA	EA	Total
ACIT 3124	Urban Planning and Development	3	0	0	3	40	60	100
ACIT 3125	Traffic Engineering and Management	3	0	0	3	40	60	100
ACIT4130	Design of Bridges	3	0	1	4	40	60	100
ACIT4131	Pavement Engineering	3	0	0	3	40	60	100

GROUP E CONSTRUCTION MANAGEMENT

Code No.	Course Title	L	T	P	Credit	Marks		
						CA	EA	Total
ACIT3127	Construction Management	3	0	0	3	40	60	100
ACIT3128	Concrete Technology	3	0	0	3	40	60	100
ACIT3129	Advanced Construction Techniques	3	0	0	3	40	60	100
ACIT4132	Lean Construction Concepts, Tools and Practices	3	0	0	3	40	60	100
ACIT4133	Construction Planning, Scheduling and Control	3	0	0	3	40	60	100

(iv)**Institute Electives (IE)** comprising of Professional elective courses from respective Departments and provides the opportunity to a students to choose any course of any stream. A student should choose atleast 2 courses during the programme.

INSTITUTE ELECTIVES				
Sl.No.	**Branch**	**Course Code**	**Course Name**	**Credits**
1	**CSE**	ACST3112	Soft Computing and its applications	3
2	**CSE**	ACST3120	Artificial Intelligence For Real World Applications	3
3	**CSE**	ACST4124	Machine Learning For Real World Applications	3
4	**CSE**	ACST4139	Applied Cloud Computing	3
5	**IT**	AITT3111	Cyber Security Fundamentals	3
6	**IT**	AITT3119	PRACTICAL APPROACH TO DATA MINING AND ANALYTICS	3

7	**IT**	AITT4129	Big Data Analytics Tools and Applications	3
8	**IT**	AITT4130	Foundations of Block Chain Technologies	3
9	**ECE**	AECT3117	Electromagnetic Interference and Compatibility	3
10	**ECE**	AECT3120	PCB Design	3
11	**ECE**	AECT3121	Digital Design using EDA tools	3
12	**CSE, IT**	AITT3120	Internet of Things – Overview & its Application	3
13	**EEE**	AEET3112	Industrial Automation	3
14	**EEE**	AEET3119	Electric Vehicle Drive System	3
15	**EEE**	AEET4140	Robotic Systems	3
16	**Mech**	AMET4163	Waste Management	3
17	**Mech**	AMET4164	Computer Workstation Ergonomics	3
18	**Mech**	AMET4165	Structure and Properties of Materials	3
19	**Mech**	AMET4166	Total Quality Management	3
20	**Mech**	AMET4167	Supply chain Management	3
21	**Mech**	AMET4168	Industrial Automation	3
22	**Civil**	ACIT4130	Disaster Management	3
23	**Civil**	ACIT4131	Climate Change	3
24	**Civil**	ACIT4132	Building Planning and Construction	3
25	**Civil**	ACIT4125	Environmental Impact Assessment	3
26	**BME**	ABMT4128	Trouble shooting of Medical Instruments	3
27	**BME**	ABMT3117	Biomedical Nanotechnology	3
28	**BME**	ABMT1101	Biology for Engineers	3
29	**BME**	ABMT4136	Bioinformatics	3

30	**HUM**	AHMT4101	Gender, Culture and Development studies	3
31	**HUM**	AHMT4102	State, Nation Building and Politics	3
32	**HUM**	AHMT4103	Work Ethics, Corporate Social responsibility and Governance	3
33	**HUM**	AHMT4104	Indian Constitution, Essence of Indian Knowledge Tradition	3
34	**HUM**	AMBT3102	Cognitive Science	3
35	**MBA**	AMBT3103	Stock Trading Fundamentals	3
36	**MBA**	AMBT3104	Industrial Economics	3
37	**MBA**	AMBT3105	Finance for Non Finance Professionals	3
38	**Maths**	AMAT2105	Numerical Methods	3
39	**Maths**	AMAT2106	Statistics and Numerical Methods	3
40	**Maths**	AMAT2107	Probability and Random Processes	3
41	**Maths**	AMAT2108	Probability and Statistics	3
42	**Maths**	AMAT2109	Probability and Queuing Theory	3
43	**Maths**	AMAT2110	Resource Management Techniques	3

(vi)**ONLINE Courses:** The department Board of Studies (BoS) shall approve the list of online courses offered by approved external agencies. While listing the courses, the BoS shall consider the following points:

a. The course evaluation is carried out by the same external agency

b. Equivalent grading mechanism to be arrived at by the department

A student can register up to a maximum of 24 credits (total) as online courses during the entire programme of study. These shall be treated as Elective courses (program elective or institute elective). Students may be allowed to register for one course per semester starting from 5^{th} session onwards.

(vii)**Internship Training** during the course of study.

(viii)**Project Work**

b. Each semester curriculum shall normally have a blend of lecture courses and practical courses.

3.1 MEDIUM OF INSTRUCTION:

The medium of instruction, examinations and project report will be in English Language throughout the Programme.

3.2 CREDIT ALLOTMENT TO COURSES

Each course is normally assigned certain number of credits as follows:

- **Lecture Hours (Theory)** **:** 1 credit per lecture hour per week.
- **Laboratory Hours** **:** 1 credit for 2 Practical hours, 2 credits for 3 or 4 hours of practical per week.
- **Project Work phase I** **:** 3 credits for 6 hours of project work (Phase - I) per week.
- **Project Work phase II** **:** 7 credits for 14 hours of project work (Phase - II) per week.
- **Internship Training** **:** 2 credits for 2 weeks of Training

*** All the engineering course having 3 credits may have 4 lecture hours of which one hour will be dedicated for tutorial which will not be accounted as a credit.**

(v) DURATION OF THE PROGRAMME

A student is normally expected to complete the B.E./B.Tech. Programme in 8 semesters but in any case not more than 12 consecutive semesters from the time of commencement of the course (not more than 10 semesters for those who join 3rd semester under Lateral entry system).

(vi) REQUIREMENTS FOR COMPLETION OF A SEMESTER

A candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirement for completion of a semester.

- He/She secures not less than 75% of overall attendance in that semester.
- Candidates who do not have the requisite attendance for the semester will not be permitted to write the semester Examinations.

(vii) VARIOUS POSITIONS IN A DEPARTMENT

6.1 **DEAN** : All Engineering Departments are headed by a Dean. The dean is responsible for all activities taking place in coordination with all department heads and all staff members belonging to them. The Dean shall act as a linkage between the HoD's, faculty members and the students. The Dean makes a review of all the academic activities of staff, students and research on a regular time interval and takes steps to improve the morale of all staff and students.

6.2 HEAD OF THE DEPARTMENT

Each department offering various UG and PG programmes is headed by a Head (HoD). The head of the department (HoD) is responsible for allotting courses to each staff member uniformly in consultation with other HoD's and School Deans. The HoD is responsible for streamlined teaching of courses to students, improvement and assessment of teaching quality within the department on a continuous basis, assessment of staff members, transparent conduct of continuous assessment examinations, interacting with parents, ensuring that all academic and non-academic activities of staff and students are monitored and steps taken for their improvement.

6.3 FACULTY ADVISOR

To help the students in planning their courses of study and to render general advice regarding either the academic programme or any other activity, the Head of the Department concerned, will assign every year, a certain number of students from the first year to a faculty member who will be called as Faculty Advisor. The set of students thus assigned will continue to be under the guidance of this Faculty Advisor till they complete the programme or replaced by the HOD. The Faculty Advisor gets information about the syllabus coverage by the staff members, requirements of the students academically and otherwise, attendance and progress of the students from the respective class counselors. The Faculty Advisor also informs the students about the academic schedule including the dates of assessments and syllabus coverage for each assessment, weightage for each assessment, their continuous assessment marks and attendance % details before the commencement of end semester examinations.

6.4 CLASS COUNSELOR

There shall be a class counselor for each class/section. The class counselor will be one among the teachers of the department. He/She will be appointed by the Head of the respective department. The responsibilities for the class counselor shall be:

- To act as the channel of communication between the HoD, dean, year coordinator, course coordinator, staff and students of the respective class.
- To collect and maintain various statistical details of students.
- To help the year coordinator in planning and conduct of the classes.
- To monitor the academic performance of the students including attendance and to inform the year coordinator.
- To take care of the students' welfare activities like industrial visits, seminars, awards etc.

6.5 COURSE COORDINATOR FOR EACH COURSE

Each theory course offered to more than one class or branch or group of branches, shall have a "course coordinator". The course coordinator will be nominated by the school dean in consultation with respective head of the department. The course coordinator will be normally a senior staff who is one among the teachers teaching the course.

The "Course Coordinator" shall meet the teachers handling the course, as often as possible and ensure

- A common teaching methodology is followed for the course.
- The study materials are prepared by the staff members and communicated to the students periodically.
- The involvement of students in course based projects and assignments.
- To prepare common question paper for continuous assessment exams.
- For uniform evaluation of continuous assessments answer sheets by arriving at a common scheme of evaluation.

The course coordinator is responsible for evaluating the performance of the students in the continuous assessments and end semester examinations and analyse them to find suitable methodologies for improvement in the performance. The analysis should be submitted to the HoD and school dean for suitable action.

6.6 CLASS COMMITTEE

a) Constitution of the Class Committee

For every class, a class committee shall be constituted by the Heads of Department, as given below:

Chairman	A faculty member not teaching that particular class
Members	• Faculty of all the courses of study • Four student members from the class to be nominated by the Head of the Department

b) Functions of the Class Committee

(i) The class committee shall meet thrice during the session. The first meeting will be held within two weeks from the date of commencement of the session in which the nature of the broad assessment procedure for the different courses will be discussed. The second and third meetings will be held six weeks and ten weeks respectively from the commencement of a session to meaningfully interact and express opinions and suggestions to improve the effectiveness of teaching - learning process and analyze the performance of the students in the assessments. The chairperson of the class committee should send the minutes of the class committee meetings to the Dean through the Head of the Department, immediately after the class committee meetings.

(ii) During the first meeting of the class committee, all the faculty members shall give their course plan to the class committee chairperson for approval and uploading into the course plan website

(iii) Any innovation in any course plan not agreed by the class committee or the HoD will be referred to the Chairman for approval.

7 COURSE PLAN AND DELIVERY

a) The course plan (**IC, IE ,PC and PE, OE**) will have details of the overview of the course, course objectives, course outcome, course teaching and learning activities and course assessment methods and policy on compensation assessment.

b) Each course will have tailor-made assessment models viz. group tasks, assignments, report on field visit, quizzes, open book tests, laboratory exercises, mini-project and end of session summative assessment etc. The course plan will also have details of information on study materials.

c) The number of assessments for a course shall range from 4 to 6.

d) Every course should have a final assessment (End Semester) on the entire syllabus with 60% weightage.

e) The course plan shall be approved by the Class Committee (CC) chairperson and the HoD of the Department offering the course.

f) The Course plans for all courses offered by the Institute will be available in the website for reference by the faculty and students.

8 ATTENDANCE

All courses should have a common attendance policy:

a) At least 75% attendance in each course is mandatory.

b) A maximum of 10% shall be allowed under On Duty (OD) category.

c) Students with less than 65% of attendance shall be prevented from writing the End Semester Examination..

9 ASSESSMENT PROCEDURE

Each **COURSE** shall have assessments done according to the Course Plan drawn by the faculty who handles the course . The assessments of a course will depend on the needed course learning outcomes.
There will be a continuous assessment examination and end semester examination for both theory and practical courses of all programmes.

(i) Theory courses

Continuous Assessment (CAE) : 40 Marks
End Semester Exams (ESE) : 60 Marks

(ii) Practical courses

Continuous Assessment (CAE) : 40 Marks
End Semester Exams (ESE) : 60 Marks

9.1 CONTINUOUS ASSESSMENT EXAMS (CAE)

(a) Theory Courses

- There will be a minimum of Three continuous assessment exams (Assessment Test 1,2 and a Model Exam) , for each theory course.

DISTRIBUTION OF CONTINUOUS ASSESSMENT EXAM (CAE) MARKS FOR A THEORY COURSE			
Evaluation Component	**Syllabus coverage**	**Duration of the Exam**	**Max. Weightage**
CAE-1	**First 1.5 Units of the syllabus**	**2 Hours**	**25 Marks (20% weightage for CAE 1 & CAE 2 and 60% for Model Exam)**
CAE-2	**Next 1.5 Units of the syllabus**	**2 Hours**	
Model Exam	**Full syllabus**	**3 Hours**	
Assignment	• **2 written assignments for each course /** • **Written quiz (or) Presentation of a written Report (or) Case study /** • **Multiple choice Objective Type Test**		**10 Marks**
Mini Project (or) Group Presentation	• **Technical Project involving not more than 3 students (or) any other Group Presentation related to the course.**		**5 Marks**

The total marks secured in the assessment exams out of 100, will be converted to 40 Marks.

- The continuous assessment marks obtained by the candidate in the first appearance shall be retained, considered and valid for all subsequent attempts, till the candidate secures a pass.

(b) Practical Courses

- For practical courses, the student will be evaluated on a continuous basis for 20 Marks (which will include performing all experiments, submitting observation and record note book in scheduled format and time), 15 marks for model exam at the end of the semester and 5 marks for

attendance in the course.

- For practical courses, if a student has been absent for some practical classes or has performed poorly, then the student will have to get permission from the lab incharge and year coordinator to do the experiments, so that he/she meets all the requirements for the course and thereby allowed to appear for model and end semester exams.

- If a student has not done all the experiments assigned for that lab, before the scheduled date or has attendance percentage less than 90%, the student will not be allowed to appear for the model and end semester practical exam. Such students will have to redo the course again by doing all the experiments in the next semester when the course is offered.

9.2 END SEMESTER EXAMINATIONS (ESE)

- The end semester examinations shall normally be conducted between October and December during the odd semesters and between March and May during the even semesters for both theory and practical courses of all programmes.

- End semester examinations will be conducted for a maximum of 100 marks. The marks secured in end semester exams will be converted to 60 marks.

- End semester practical exams will be conducted for a maximum of 50 marks.

9.3 Internship / Industrial Training

- Every student is required to undergo Industrial Visits during every semester of the Programme. HoDs shall take efforts to send the students to industrial visits in every semester.
- Every student will have to undergo Internship / Industrial training for a Minimum period of 2-3 weeks during the semester Holidays at the end of second year and Third Year.

- This could be internship in an industry approved by the Dean or Professional Enrichment courses (like attending Summer Schools, Winter Schools, Workshops) offered on Campus or in Registered Off Campus recognised Training Centres approved by the Dean for a minimum period of 3 weeks.

- A report on Training undergone by the student, duly attested by the Coordinator concerned from the industry / Organisation, in which the student has undergone training and the Head of the Department concerned, shall be submitted after the completion of training. The evaluation of report and viva voce examination can be computed as per norms for the End Semester examination.

- The evaluation of training will be made by a three member committee constituted by Head of the Department in consultation with Faculty Advisor and respective Training Coordinator. A presentation should be made by the student before the Committee, based on the Industrial Training or Professional Enrichment undergone.

9.4 PURSUING COURSES IN OTHER INDIAN INSTITUTIONS AND ABROAD

- A student can be selected, to get Professional Exposure in his/her area of Expertise in any Reputed Research Organization or Educational Institution of repute or any Universities in India and abroad.

- This is possible only with the List of Research Organizations, Educational Institutions in India and abroad approved by the Academic Council.

- The student can have the option of spending not more than three to Six months in the Final year or Pre-final year of his/her Degree. During this period, the student can do his/her Project work or register for courses which will be approved by the Class Committee and Dean, under the Guidance of a Project Supervisor who is employed in the Organization and Co-guided by a staff member from our Institution.

- Credit Transfer can be done by the CoE on submission of certificate through the HoD and Dean within 15 days of completion of the training.

- The students who undergo training outside the Institution (either in India or Abroad) is expected to abide by all Rules and Regulations to be followed as per Indian and the respective Country Laws, and also should take care of Financial, Travel and Accommodation expenses.

9.5 NSS/ NCC/ YRC/SPORTS Training

NSS/ NCC/ YRC training is compulsory for all the Undergraduate students:

- The activities will include Practical / Field activities / Extension lectures. The activities shall be beyond class hours.
- The student participation shall be for a minimum period of 45 hours per session during the first / Second year.
- The activities will be monitored by the respective faculty in charge and the Year Coordinator.
- Grades will be awarded on the basis of participation, attendance, performance and behavior. Grades shall be entered in the mark statement as given below:

  Very Good, Good, Satisfactory and **Unsatisfactory**

- If a student gets an unsatisfactory Grade, he/she has to repeat the above activity in the subsequent years, along with the first year students.
- The Grades awarded by the Faculty in-charge shall be entered in the Third Year (Sixth Semester) Mark Statement.
- A student who has not completed the **NSS / NCC / YRC** requirements in first six semesters will not be permitted to continue the B.Tech. Programme.

9.6 PROJECT WORK

- Project work has to be done by each student in the final year. The project work has been divided in to two phases (Phase - I and II). Project work Phase - I has to be done in the pre-final semester and Phase - II during the final semester.

- Permission for project work in the second year of the programme in general will be given to innovative and industry related work. Such projects will be evaluated in every session until the VIII semester. If the evaluation committee is satisfied with the progress of the project work, continuation for the project work will be given until the final assessment is made in the VIII semester. In case, there is no tangible progress in a session, such project work will be terminated and the students will have to do their project in the final year in their respective departments.

- Project work may be allotted to a single or two students as a group. In special cases, the number of students in a project group cannot exceed three, if it can be justified by the project supervisor and HoD,

that the project work content is large enough.

- For project work, assessment is done on a continuous basis by 3 reviews for 50 marks and final viva voce carries 50 Marks.
- There shall be three project reviews (conducted during the pre-final semester and final semester) to be conducted by a review committee. The student shall make presentation on the progress made, before the committee. The head of the department shall constitute the review committee for each branch in consultation with school dean. The members of the review committee will evaluate the progress of the project and award marks.

	PROJECT REVIEWS			FINAL PROJECT VIVA VOCE
	1	2	3	
Max. Marks	5	15	30	50

- The total marks obtained in the three reviews, rounded to the nearest integer is the continuous assessment marks out of 50. There shall be a final viva-voce examination at the end of final semester conducted by one internal examiner, one external examiner and the supervisor concerned.
- A student is expected to attend all the project reviews conducted by the institution on the scheduled dates. It is mandatory for every student to attend the reviews, even if they are working on a project in an industry based outside Chennai city. It is their duty to inform the organization about the project reviews and its importance, and get permission to attend the same. If a student does not attend any of the project reviews, he / she shall not be allowed for the successive reviews and thereby not allowed to appear for the final viva voce.
- The final project viva-voce examination shall carry 50 marks. Marks are awarded to each student of the project group based on the individual performance in the viva-voce examination. The external examiner shall be appointed by the controller of examinations. The internal and external examiner will evaluate the project for 20 Marks each. The project report shall carry a maximum of 10 marks.
- The candidate is expected to submit the project report as per the guidelines of the institution on or before the last day of submission. If a candidate fails to submit the project report on or before the specified deadline, he/she can be granted an extension of time up to a maximum limit of 5 days for the submission of project work, by the head of the department.
- If he/she fails to submit the project report, even beyond the extended time, then he/she is deemed to have failed in the project work and shall register for the same in the subsequent semester and re-do the project after obtaining permission from the HoD and Dean.
-

9.7 **REVALUATION OF ANSWER PAPERS**;

A candidate can apply for revaluation of his/her End semester examination answer paper in a theory course, immediately after the declaration of results, on payment of a prescribed fee along with application to the Controller of Examinations through the Head of the Department. The Controller of Examination will arrange

for the revaluation and the result will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

10 PASSING REQUIREMENTS

- A candidate should secure not less than 50% of total marks **(Minimum 50%** of the grand total of CAE Marks and ESE marks put together) prescribed for the courses, subject to securing a minimum of 30% marks out of maximum mark in End Semester Exams (ESE). Then he/she shall be declared to have passed in the examination.
- If a candidate fails to secure a pass in a particular course, it is mandatory that he/she shall register and reappear for the examination in that course during the next semester when examination is conducted in that course. It is mandatory that he/she should continue to register and reappear for the examination till he/she secures a pass.

11 WITHDRAWAL FROM EXAMINATIONS

- A candidate may, for valid reasons, (medically unfit / unexpected family situations) be granted permission to withdraw from appearing for the examination in any course or courses in any one of the semester examination during the entire duration of the degree programme.
- Withdrawal application shall be valid only if the candidate is otherwise normally eligible (if he/she satisfies Attendance requirements and should not be involved in Disciplinary issues or Malpractice in Exams) to write the examination and if it is made within FIVE days before the commencement of the examination in that course or courses and also recommended by the Dean through HoD.
- Notwithstanding the requirement of mandatory FIVE days notice, applications for withdrawal for special cases under extraordinary conditions will be considered based on the merit of the case.
- Withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class – ……, First Class with Distinction and First Class.
- Withdrawal is NOT permitted for arrears examinations of the previous semesters.

12 AUTHORIZED BREAK OF STUDY

- This shall be granted by the Institution, only once during the full duration of study, for valid reasons for a maximum of one year during the entire period of study of the degree programme.
- A candidate is normally not permitted to temporarily break the period of study. However, if a candidate would like to discontinue the programme temporarily in the middle of duration of study for valid reasons (such as accident or hospitalization due to prolonged ill health), he / she shall apply through the School Dean in advance (Not later than the Reopening day of that semester) through the Head of the Department stating the reasons. He /She should also mention clearly, the Joining date and Semester for Continuation of Studies after completion of break of Study. In such cases, he/she will attend classes along with the Junior Batches. A student who availed break of study has to rejoin only in the same semester from where he/she left.
- The authorized break of study will not be counted towards the duration specified for passing all the courses for the purpose of classification only for First Class.

- The total period for completion of the programme shall not exceed more than 12 consecutive semesters from the time of commencement of the course (not more than 10 semesters for those who join 3rd semester under Lateral entry system) irrespective of the period of break of study in order that he / she may be eligible for the award of the degree.

- If any student is not allowed to appear for End Semester Examinations for not satisfying Academic requirements and Disciplinary reasons, (Except due to Lack of Attendance), the period spent in that semester shall NOT be considered as permitted 'Break of Study' and is NOT applicable for Authorized Break of Study.

- In extraordinary situations, a candidate may apply for additional break of study not exceeding another one Semester by paying prescribed fee for break of study. Such extended break of study shall be counted for the purpose of classification of First Class Degree.
- If the candidate has not reported back to the department, even after the extended Break of Study, the name of the candidate shall be deleted permanently from the institution enrolment. Such candidates are not entitled to seek readmission under any circumstances.

13 AWARD OF DEGREE

All assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each course as detailed below:

RANGE OF MARKS FOR GRADES

Range of Marks	Letter Grade	Grade Points (GP)
90 -100	**O**	**10**
80 – 89	**A**	**9**
70 – 79	**B**	**8**
60 – 69	**C**	**7**
50 – 59	**D**	**6**
00-49 (Reappear)	**RA**	**0**
ABSENT	**AAA**	**0**
Withdrawal	**W**	**0**
Authorised Break of Study	**ABS**	**0**

13.1 CUMULATIVE GRADE POINT AVERAGE CALCULATION

The CGPA calculation on a 10 Point scale is used to describe the overall performance of a student in all courses from first semester to the last semester. RA, AAA and W grades will be excluded for calculating GPA and CGPA.

$$GPA = \frac{\sum_{i=1}^{N} Ci\ GPi}{\sum i\ Ci} \qquad CGPA = \frac{\sum_{i=1}^{n} Ci\ GPi}{\sum i\ Ci}$$

Where

Ci – Credits for the course

GPi – Grade Point for the course

$\sum i$ – Sum of all courses successfully cleared during all the semesters

n – Number of all courses successfully cleared during the particular semester in the case of GPA and during all the semesters in the case of CGPA

14 GRADE SHEET

After revaluation results are declared in each semester, Grade Sheets will be issued to each student. At the end of programme a consolidated grade sheet also will be issued to each student. The grade sheet and consolidated grade sheet will contain the following details:

- Name of the candidate with date of birth and photograph.
- The programme and degree in which the candidate has studied
- The list of courses enrolled during the semester and the grade secured
- The Grade Point Average (GPA) for the semester.

15 CLASSIFICATION OF DEGREE AWARDED

Final Degree is awarded based on the following:

Range of CGPA	Classification of Degree
≥ 7.50	First Class with Distinction
≥ 6.00 <7.50	First Class
≥ 5.00 < 6.0	Second Class

Minimum requirements for award of Degree: A student should have obtained a minimum of 5.0 CGPA.

1. A candidate who qualifies for the award of the Degree having passed the examination in all the courses of all the 8 semesters in his/her first appearance within a maximum of 8 consecutive semesters (maximum of 6 semesters for Lateral entry students who join the course in the third semester) securing a overall CGPA of not less than 7.5 (Calculated from 1st semester) shall be declared to have passed the examination in **First Class with Distinction**. Authorized Break of Study vide Clause 12, will be considered as an Appearance for Examinations, for award of First Class with Distinction. Withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class with Distinction.

2. A candidate who qualifies for the award of the Degree having passed the examination in all the courses of all the 8 semesters within a maximum period of 8 consecutive semesters (maximum of 6 semesters for Lateral entry students who join the course in the third semester) after his/her commencement of study securing a overall CGPA of not less than 6.0 (Calculated from 1st semester), shall be declared to have passed the examination in **First Class.** Authorized break of study vide Clause 12 (if availed of) or prevention from writing End semester examination due to lack of attendance will not be considered as Appearance in Examinations. For award of First class, the extra number of semesters than can be provided (in addition to four years for Normal B.E / B.Tech and 3 years for Lateral Entry) will be equal

to the Number of semesters availed for Authorized Break of Study or Lack of Attendance. Withdrawal shall not be considered as an appearance for deciding the eligibility of a candidate for First Class.

3. All other candidates who qualify for the award of the Degree having passed the examination in all the courses of all the 8 semesters within a maximum period of 12 consecutive semesters (10 consecutive semesters for Lateral Entry students, who join the course in the third semester) after his/her commencement of study securing a overall CGPA of not less than 5.0, (Calculated from 1st semester) shall be declared to have passed the examination in **Second Class**.

4. A candidate who is absent in semester examination in a course/project work after having registered for the same, shall be considered to have appeared in that examination for the purpose of classification.

16 ELIGIBILITY FOR THE AWARD OF DEGREE

A student shall be declared to be eligible for the award of the B.E/B.Tech. degree, provided the student has successfully completed all the requirements of the programme, and has passed all the prescribed examinations in all the 8 semesters within the maximum period specified in clause 3.

i) Successfully gained the required number of total credits as specified in the curriculum corresponding to his/her programme within the stipulated time.

ii) Successfully completed the programme requirements and has passed all the courses prescribed in all the semesters within a maximum period of 6 years (5 Years for Lateral Entry Candidates) reckoned from the commencement of the first semester to which the candidate was admitted.

iii) Successfully completed any additional courses prescribed by the Institution.

iv) has earned a CGPA of not less than 5

v) has no dues to the Institution, Library, Hostels, etc.,

vi) has no disciplinary action pending against him / her.

vii) No disciplinary action pending against the student.

The award of Degree must have been approved by the Board of Management of the Institution.

17 DISCIPLINE

Every student is required to observe disciplined and decorous behaviour both inside and outside the Institution and not to indulge in any activity which will tend to bring down the prestige of the Institution. If a student indulges in malpractice in any of the end semester theory / practical examination, continuous assessment examinations he/she shall will be liable for disciplinary action as prescribed by the Institution from time to time.

18 POWER TO MODIFY

From time to time, the Institution may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

Contribution 1: Reasonable 2: Significant 3: Strong

Programme Educational Objectives	Programme Outcomes								
	1	2	3	4	5	6	7	8	9
1	3	3	3	3		3	3	3	
2									3
3					3				

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES

	Semester	Course Name	Programme Outcomes								
			1	2	3	4	5	6	7	8	9
YEAR I	I	English							2		3
		Mathematics - I	3	2	2						
		Chemistry	3	2	2						
		Basic Electrical and Electronics Engineering	3					2			
		Engineering Graphics & Design		3	2						
		Chemistry Laboratory	3	2	2						
		Engineering Practices Laboratory			2	2					
	Semester	**Course Name**	**Programme Outcomes**								
			1	2	3	4	5	6	7	8	9
YEAR I	II	Mathematics – II	3	2	2						
		Physics	3	2	2						
		Envionmental Science		3	2						
		Computer Programming		3	2	2					
		Engineering Mechanics		3	3						
		Physics Laboratory	3	2	2						
		Computer Programming (Lab)		3	2	2					
		Soft Skills Lab1					2	2	3	2	3
	Semester	**Course Name**	**Programme Outcomes**								
			1	2	3	4	5	6	7	8	9
YEAR II	III	Transform & Discrete Mathematics	3	2	2						
		Engineering Geology		3							
		Strength of Materials I	3	3	3	2					
		Construction Materials		3	3						
		Fluid Mechanics and Machinery	3	3	3	2					
		Strength of Materials Lab	3	3	3	2	2				
		Construction Materials Lab	3	3	3	2	2				
		Fluid Mechanics and Machinery Lab	3	3	3	2	2				
		Soft Skills Lab 2					2	2	3	2	3
	Semester	**Course Name**	**Programme Outcomes**								
			a	**b**	**c**	**d**	**e**	**f**	**G**	**h**	**i**

YEAR II	IV	Construction Technology		2	2			3	3	3	
		Strength of Materials II	3	3	3	2	2				
		Surveying	3	3	3	2	2				
		Water Supply Engineering	3	3	3	2	2				
		Soil Mechanics	3	3	3	2	2				
		Surveying Lab	3	3	3	2	2	2			
		Soil Mechanics Lab	3	3	3	2	2				
		Computer Aided Building Drawing Lab	3	3	3	2	2				
		Internship	3	3	3	3	3	3	3	3	3
		Soft Skills Lab 3					2	2	3	2	3
	Semester	**Course Name**	**Programme Outcomes**								
			1	2	3	4	5	6	7	8	9
YEAR III	V	Structural Analysis I	3	3	3	2	2				
		Foundation Engineering	3	3	3	2	2				
		Waste Water Engineering	3	3	3	2	2				
		Design of Reinforced Concrete Elements	3	3	3	2	2				
		Water Resources and Irrigation Engineering	3	3	3	2	2				
		Professional Elective I									
		Water and Waste Water Engineering Lab	3	3	3	2	2				
		Computer Aided Structural Drawing Lab	3	3	3	2	2	2	3	2	
		Soft Skills Lab 4					2	2	3	2	3
	Semester	**Course Name**	**Programme Outcomes**								
			1	2	3	4	5	6	7	8	9
YEAR III	VI	Structural Analysis II	3	3	3	2	2				
		Design of Steel Structural Elements	3	3	3	2	2				
		Tranportation Enigneering	3	3	3	2	2				
		Open Elective I(from other departments):									
		Professional Elective II									
		Online Elective									
		Transportation Engineering Laboratory	3	3	3	2	2				
		Internship	3	3	3	3	3	3	3	3	3
		Soft Skills Lab 5					2	2	3	2	3
		NCC/YRC/Sports						3	3	2	3
	Semester	Course Name	**Programme Outcomes**								
			1	2	3	4	5	6	7	8	9
YEAR IV	VII	Principles of Management &Professional Ethics							3	2	2
		Estimation and Quantity survying	2				2	3	2	3	2
		Professional Elective III									
		Professional Elective IV									
		Open Elective-II (from other departments):									
		Project Phase I	3	3	3	3	3	3	3	3	3
	Semester	Course Name	**Programme Outcomes**								
			1	2	3	4	5	6	7	8	9
YEA	VIII	Professional Elective V									
		Professional Elective VI									
		Project Work	3	3	3	3	3	3	3	3	3

R **I** **V**											

PROGRAM ELECTIVES

GROUP A : STRUCTURAL ENGINEERING

Year	Course Name	**Programme Outcomes**								
		1	2	3	4	5	6	7	8	9
III	Advanced concrete structures	2		3		2	3		2	
III	Structural Dynamics and Earthquake Engineering	2	2	3	2	2			3	
IV	Prestressed Concrete Structres	2		3		2	3		3	
IV	Design of RC and Steel Storage Structures	2	2	3	3	2	3		3	
IV	Tall Buildings	2	2	3	3	2	3		3	
IV	Precast Concrete Structures	2	2	3		2	3		3	
IV	Repair and Rehabilitation of Structures	2	2	3		2	3		3	

GROUP B WATER RESOURCES ENGINEERING

Year	Course Name	**Programme Outcomes**								
		1	2	3	4	5	6	7	8	9
III	Total Station and GPS	2	2	3	2	2	3		2	
III	Remote sensing Techniques and GIS	2	2	3	2	2	2		3	
IV	Hydrology	2		3		2	3		3	
IV	Ground Water Engineering	2		3	3	2	3		3	
IV	Ground Improvement Techniques	2	2	3	3	2	3		3	
IV	Design of Hydraulic Structures	2	2	3	2	2	3		3	

GROUP C ENVIRONMENTAL ENGINEERING

Year	Course Name	**Programme Outcomes**								
		1	2	3	4	5	6	7	8	9
III	Municipal Solid Waste Management	2	2	3			3		2	
III	Industrial Waste Management	2	2	3		2	2		3	
IV	Air Pollution Management	2		3	3	2	3		3	
IV	Environmental Impact Assessment	2		3	3	2	3	2	3	

I Semester

AELT1101	ENGLISH	L	T	P	C	Total Marks
		3	0	0	3	100

PREREQUISITES: None

COURSE OBJECTIVES

- The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

1. Vocabulary Building **8**

- **1.1** The concept of Word Formation
- **1.2** Root words from foreign languages and their use in English
- **1.3** Acquaintance with prefixes and suffixes from foreign languages in in English to form derivatives.
- **1.4** Synonyms, antonyms, and standard abbreviations.
- **1.5** Parts of Speech
- **1.6** Wh -questions & Yes/No questions
- **1.7** Compound Words

2. Basic Writing Skills **8**

- **2.1** Sentence Structures
- **2.2** Writing Instruction
- **2.3** Importance of proper punctuation
- **2.4** Creating coherence
- **2.5** Writing purpose statement
- **2.6** Impersonal passive Voice
- **2.7** E-mail communication
- **2.8** Extended communication

3. Identifying Common Errors in Writing **8**

- **3.1** Subject-verb agreement
- **3.2** Adverb and Numerical adjective
- **3.3** Cause and effect relationship
- **3.4** Prepositions
- **3.5** IF Conditionals
- **3.6** Articles
- **3.7** Error deduction and proof reading

4. Nature and Style of sensible Writing **8**

- **4.1** Descriptive writing
- **4.2** Recommendation
- **4.3** Transcoding & Interpretation of Information
- **4.4** Process description
- **4.5** Checklist
- **4.6** Jumbled sentences
- **4.7** Dialogue writing

5. Writing Practices **8**

- **5.1** Reading Comprehension

5.2 Paragraph writing
5.3 Report writing
5.4 Letter writing (Formal &Informal letters)

6. Oral Communication **5**

(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations
- Group Discussion

TOTAL HOURS : 45

COURSE OUTCOMES

After completion of this course students will be able to:

CO1: Develop language skills both formally and informally in English.
CO2: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
CO3: Understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.
CO4: Familiarize with basic technical concepts and terms.

CO5: Develop professional work habits as instructor, representative and team player.

SUGGESTED READINGS

1. Central Institute of English And Foreign Languages. Exercises in Spoken English,Parts I-III. Orient BalckSwan :New Delhi,2014.
2. Kumar, Sanjay and PushpLata."Communication Skills", Oxford University Press: Oxford, 2015.
3. Lyons, Liz Hamp and Ben Heasly."Study Writing", Cambridge University Press:Cambridge, 2006.
4. Swan, Michael." Practical English Usage" .Oxford University Press: Oxford, 2016.
5. Wood, Frederick T."Remedial English Grammar".Macmillan, 2014.
6. ZinsserWilliam, "On Writing Well.",Harper Resource Book,2013.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
2	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
3	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
4	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
5	2	3	3	3	-	3	3	3	2	3	-	3	-	-	-
AVg.	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-

AMAT1101	MATHEMATICS - I	L	T	P	C	Total Marks
		3	1	0	4	100

PREREQUISITES: School Mathematics

COURSE OBJECTIVES

- Application of Matrices in problems of Science and Engineering.
- Application of Sequences and Series.
- To apply the concepts of radius of curvature, evolute, envelope and asymptotes.
- To apply the concept of Taylor series, Maxima minima, composite function and Jacobians.
- To gain knowledge in evaluation of Double and triple Integrals and its applications.

UNIT 1: MATRICES **9+3**

Introduction – Symmetric-Skew Symmetric Matrices-Hermitian and Skew Hermitian Matrices-Characteristic equation-Eigen values of a real matrix-Eigen vectors of a real matrix-Properties of Eigen values-Cayley – Hamilton theorem- finding A inverse using cayley Hamilton theorem- Finding higher powers of A using Cayley – Hamilton theorem-orthogonal reduction of a symmetric matrix to diagonal form-Reduction of Quadratic form to canonical by orthogonal transformations-Orthogonal matrices-Applications of Matrices in Engineering.

UNIT 2: SEQUENCE AND SERIES **9+3**

Sequences – Definition and Examples- Types of Convergence- Series of Five terms – Test of Convergence- Comparison test – Integral test- D'Alemberts Ratio test- Raabe's root test- Covergent of Exponential Series- Cauchy's Root test- Log test- Alternating Series: Leibnitz test- Series of positive and Negative terms- Absolute Convergence- Conditional Convergence- Simple Applications Convergence of series in engineering.

UNIT 3: APPLICATIONS OF DIFFERENTIAL CALCULUS **9+3**

Rolls and Mean Value Theorem-Maxima and Minima of one variable-Radius of Curvature – Cartesian and polar coordinates - Circle of curvature- Applications of Radius of curvature in engineering-Evolute – Involute -Asymptotes - Envelope of standard curves- - Beta Gamma Functions and their Properties.

UNIT 4: DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES **9+3**

Function of two variables – Partial derivatives-Eulers Theorems- Total differentials- Taylor's expansion with two variables up to third order terms- Maxima and Minima- Constrained Maxima and Minima by Lagrangian Multiplier method- Jacobians - Properties of Jacobians.

UNIT 5: INTEGRALCALCULUS **9+3**

Evaluation of double integration in Cartesian and polar coordinates-Evaluation of double integral by changing of order of integration-Area as a double integral using Cartesian and polar- -Conversion from Cartesian to polar in double integrals- Triple integration in Cartesian coordinates and its applications

TOTAL HOURS :60

COURSE OUTCOMES

After completion of this course students will be able to:

CO1: Know how the Matrices, Eigen values and Eigen Vectors Reduce to Quadratics form.
CO2: Attain the skills of convergence and divergence of series using different test and apply sequences and Series in the problems.
CO3: Understand the concepts of envelope and Circle of curvature and apply them in the problems.
CO4: Obtain the knowledge of Maxima and Minima, Jacobian, and Taylor series.
CO5: Understand the evaluation of multiple integrals using change of variables and its applications.

CO6: Develop the canonical form of a quadratic form. Construct evolutes and envelope of family of curves.

TEXT BOOKS

1.Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons,2015.

2.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015

3.C B Gupta and S R Singh and Mukesh Kumar, Engineering Mathematics for first year, Tata McGraw-Hill,1st edition, 2015.

4. 4.N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 10th edition, 2015.

5.Dr.M.K.Venkatraman, Engineering Mathematics volume-1,The National Publishing company,4th Edition,2010.

CO's-PO's & PSO's MAPPING

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-

ACYT1101	**CHEMISTRY**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PREREQUISITES: School Chemistry

COURSE OBJECTIVES

- To make the students conversant with atomic and molecular structure.
- To develop an understanding on the concepts of spectroscopic techniques and their applications.
- To understand the use of free energy in chemical equilibrium.
- To have thorough knowledge on phase rule and alloys.
- To understand the basic concepts of stereochemistry, organic reactions and synthesis of a drug molecule.

UNIT 1 : ATOMIC AND MOLECULAR STRUCTURE 9

Quantum mechanics -. Basics and significance-Schrodinger equation – Particle in one dimensional box-Molecular orbital theory- Molecular orbital diagrams of homonuclear and heteronuclear diatomic molecules. Energy level diagrams of diatomic pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures**.**

UNIT 2 : SPECTROSCOPIC TECHNIQUES AND PHOTOCHEMISTRY 9

Principles of spectroscopy-Electromagnetic spectrum- Electronic spectroscopy - Vibrational spectroscopy -Nuclear magnetic resonance spectroscopy - Principle, Instrumentation (Block diagram only) and applications –Photochemistry-Laws of photochemistry-Photo processes-Internal

conversion, Intersystem crossing, Phosphorescence, Fluorescence and its applications.

UNIT 3 : USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA 9

Thermodynamic functions: energy, entropy and free energy. Free energy and emf. Cell potentials, Nernst equation and applications. Corrosion-Types- -Control measures- Use of free energy considerations in metallurgy through Ellingham diagrams-Water Chemistry-Hardness-Types-Estimation of hardness by EDTA method-Desalination of brackish water-RO process.

UNIT 4 : PHASE RULE AND ALLOYS 9

Phase rule: Introduction, definition of terms with examples, One Component System- water system - Reduced phase rule - Two Component Systems- classification – lead-silver system, zinc-magnesium system. Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel; Non-ferrous alloys – brass and bronze.

UNIT 5 : STEREOCHEMISTRY AND ORGANIC REACTIONS 9

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transition metal compounds. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings- Synthesis of paracetamol.

TOTAL HOURS : 45

COURSE OUTCOMES

Upon Completion of the course, the students will be able to:

CO1: Analyze microscopic chemistry in terms of atomic and molecular orbitals.
CO2: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
CO3: Rationalize bulk properties and processes using thermodynamic considerations.
CO4: Evaluate various metals and alloy combinations.
CO5: Design the steps for the manufacture of drug for medicinal applications.

TEXT BOOKS

1. K. P. C. Volhardt and N.E. Schore, "Organic Chemistry: Structure and Function", 6thEdition,W.H.Freeman Publisher,NHBS,2015.
2. P. W. Atkins, Julio de Paula,," Physical Chemistry", 8th Edition, Oxford University press, Oxford, 2016.
3. Dr. Sayeeda Sultana," Engineering Chemistry'', R.K.Publishers, Coimbatore, 2016.
4. B. M. Mahan, R. J. Meyers, '' University Chemistry '', 4th Edition, Pearson Education, India, 2009.
5. Engineering Chemistry by Jain and Jain, 16th Edition, Dhanpat Rai Publishing Company, New Delhi,2017.
6. C. N. Banwell, "Fundamentals of molecular spectroscopy",5th Edition McGraw-Hill Education India Pvt Limited,India,2013.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	1	-	1	1	-	-	-	-	1	-	-	-
2	2	-	-	1	-	2	2	-	-	-	-	-	-	-	-
3	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-

4	3	1	1	-	-	1	2	-	-	-	-	-	-	-	-
5	3	1	2	1	-	2	2	-	-	-	-	2	-	-	-
Avg.	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	-	-	-

AEET1101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C	Total Marks
		3	0	0	3	100

REREQUISITES: None

COURSE OBJECTIVES

- To provide comprehensive idea about DC circuit analysis, working principles and applications of basic machines in electrical engineering.
- To provide idea about AC circuit analysis, working principles and applications of basic machines in electrical engineering.
- To highlight the importance of transformers in transmission and distribution of electric power.
- To develop selection skill to identify the type of generators or motors required for particular application.
- To impart a basic knowledge of Power Converters

UNIT 1: DC CIRCUITS **9**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation.Superposition, Thevenin and Norton Theorems.Time-domain analysis of first-order RL and RC circuits.

UNIT 2: AC CIRCUITS **9**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT 3: TRANSFORMERS **9**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.
9

UNIT 4: ELECTRICAL MACHINES **9**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT 5 : POWER CONVERTERS **9**

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

TOTAL HOURS :45

COURSE OUTCOMES

At the end of this course, students will be able to:

CO1 : Understand and analyze basic electric and magnetic circuits

CO2 : Study the working principles of electrical machines and power converters.

SUGGESTED TEXT / REFERENCE BOOKS

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University

Press, 2011.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering" , Tata McGraw Hill, 2010.
3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2019.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2011.
5. V. D. Toro, "Electrical Engineering Fundamentals", Pearson India, 2015.

CO's, PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1					1					-	-	-
2	2	1	1					1					-	-	-
3	2	1	1					1					-	-	-
4	2	1	1					1					-	-	-
5	2	1	1					1					-	-	-
Avg.	2	1	1					1					-	-	-

AMET1101	ENGINEERING GRAPHICS AND DESIGN	L	T	P	C	Total Marks
		1	0	4	3	100

PREREQUISITES: School Mathematics

COURSE OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products
- To expose them to existing national standards related to technical drawings.

UNIT 1: PLANE CURVES AND FREE HAND SKETCHING 9

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, Scales: Construction of Diagonal and Vernier scales.
Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT 2: PROJECTION OF POINTS, LINES AND PLANE SURFACES 9

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT 3: PROJECTION OF SOLIDS 9

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT4:PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT 5: ISOMETRIC AND PERSPECTIVE PROJECTIONS 9

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

COMPUTER AIDED DRAFTING (Demonstration Only)

Introduction to drafting packages and demonstration of their use.

TOTAL HOURS :45

COURSE OUTCOMES

Upon the completion of this subject, the students will be able to know:

CO1: Specifications and standards of technical drawing and able to draw conic sections and special curves.
CO2: Orthographic projection and to draw the various views of orthographic projection of a point and various components.
CO3: Orthographic views of Straight Lines, Plane Figures and Simple Solids.
CO4: Sections of solids and Development of solid surfaces.
CO5: Drawing of isometric and perspective projection of simple solids and components.

SUGGESTED TEXTS / REFERENCE BOOKS

1. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2009.
2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2017.
4. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.
5. Venugopal K. and Prabhu Raja V., "Engineering graphics", New Age International (P) Limited, 2008.
6 Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.
7 Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008..

COs- PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	2		2					3		2	2	2	
2	3	1	2		2					3		2	2	2	
3	3	1	2		2					3		2	2	2	

4	3	1	2		2					3		2	2	2	
5	3	1	2		2					3		2	2	2	
Avg	**3**	**1**	**2**		**2**					**3**		**2**	**2**	**2**	

ACYL1101	**CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**	**Total Marks**
		0	**0**	**4**	**2**	**100**

PREREQUISITES: Handling of apparatus such as burettes and pipettes

C COURSE OBJECTIVES

- To acquire the quantitative skills in volumetric analysis.
- To enable the students to plan and execute experimental projects.

LIST OF EXPERIMENTS

1. Determination of hardness of water by EDTA method.
2. Determination of chloride content of water sample by argentometric method.
3. Determination of strength of given hydrochloric acid using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter.
5. Conductometric titration of strong acid Vs strong base.
6. Estimation of iron content by Potentiometry.
7. Determination of molecular weight of polymer using Ostwald viscometer.
8. Determination of alkali content of water sample.
9. Estimation of copper by EDTA method.
10. Adsorption of acetic acid by charcoal.

TOTAL HOURS :60

COURSE OUTCOMES

On completion of the course students will be able to:

CO1: Carry out scientific experiments related to Viscosity, Conductivity, Potentiometry Hardness and Chloride content of water.

REFERENCES

1. Dr. Sayeeda Sultana,"Practical Engineering Chemistry laboratory manual", R.K.Publishers, Coimbatore, 2016.
2. Daniel R. Palleros, "Experimental organic chemistry" John Wiley & Sons, Inc. New York, 2011.
3. Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of Practical organic chemistry", LBS, Singapore, 2010.

CO's-PO's & PSO's MAPPING

CO's	**PO's**												**PSO's**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-

2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	2.4	2.6	1	1										

AMEL1101	ENGINEERING PRACTICES LABORATORY	L	T	P	C	Total Marks
		0	0	4	2	100

PREREQUISITES: None

COURSE OBJECTIVES

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE

Buildings: (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.

II MECHANICAL ENGINEERING PRACTICE

Welding:

(a) Preparation of arc welding of butt joints, lap joints and teejoints.
(b) Gas welding practice

Basic Machining:

(a) Simple Turning and Taper turning
(b) Drilling Practice

Sheet Metal Work:

(a) Forming & Bending:
(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

Machine assembly practice:

(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:

(a) Smithy operations, upsetting, swaging, setting down and bending. Example –Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EOR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL HOURS :60

COURSE OUTCOMES

Upon completion of this course, the students will be able to:

CO1: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

CO2: Wire various electrical joints in common household electrical wire work.

CO3: Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.

CO4: Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

REFERENCES

1. Jeyachandran K., Natarajan S. & Balasubramanian S., "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
2. Jeyapoovan T., Saravanapandian M. & Pranitha S., "Engineering Practices Lab Manual" Vikas Publishing House Pvt. Ltd, 2006
3. Bawa H.S., "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2007.
4. Rajendra Prasad A. & Sharma P.M.M.S., "Workshop Practice", Sree Sai Publication, 2004.

COs- PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2			1	1	1					2	2	1	1
2	3	2			1	1	1					2	2	1	1
3	3	2			1	1	1					2	2	1	1
Avg	**3**	**2**			**1**	**1**	**1**					**2**	**2**	**1**	**1**

II Semester

AMAT1102	MATHEMATICS - II	L	T	P	C	Total Marks
		3	1	0	4	100

PREREQUISITES: School Mathematics

COURSE OBJECTIVES

- To Apply the concept of Differential Equations in problems of Engineering
- To gain knowledge in evaluation of Line, Surface and Volume Integrals
- To know the techniques of Laplace Transforms and inverse transform and apply them in the problems of Science and Engineering.
- To know the properties of Analytic functions and its applications
- To gain knowledge of evaluation of improper integrals involving complex functions using Residue theorem and apply them in Engineering fields

UNIT 1: ORDINARY DIFFERENTIAL EQUATIONS 9+3

Introduction-Linear equations of second order with constant coefficients-Linear equations of second order variable coefficients- Homogeneous equation of Euler type- Homogeneous equation of Legendre's Type- Equations reducible to homogeneous form- Variation of parameters- Simultaneous first order with constant co-efficient.- Applications of Differential Equation in engineering

UNIT 2: VECTOR CALCULUS 9+3

Introduction to vectors - Gradient-divergence- curl – Solenoidal- Irrotational fields- Vector identities (without proof) –Directional derivatives- Line integrals- Surface integrals- Volume Integrals- Green's theorem (without proof)- Gauss divergence theorem (without proof),verification- Stoke's theorems (without proof) –Verification.

UNIT 3: LAPLACE TRANSFORMS 9+3

Laplace Transforms of standard functions- Transforms properties- Transforms of Derivatives and Integrals- Initial value and Final value theorems and verification of simple problems- periodic functions - Inverse Laplace transforms using partial fractions- shifting theorem- Convolution theorem- Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficient - Solution of Integral equation and integral equation involving convolution type- Application of Laplace Transform in engineering.

UNIT 4: ANALYTIC FUNCTIONS 9+3

Definition of Analytic Function –Cauchy Riemann equations- Cauchy Riemann equations- Properties of analytic function- Determination of analytic function using – Milne-Thomson's method- Conformal mappings :magnification ,rotation, inversion, reflection- bilinear transformation- Cauchy's integral theorem (without proof)- Cauchy's integral theorem applications

UNIT 5: COMPLEX INTEGRATION 9+3

Cauchy's integral formulae- Taylor's expansions with simple problems- Laurent's expansions with simple problems- Singularities- Types of Poles and Residues- Cauchy's residue theorem - Contour integration :Unit circle.- Contour integration :semicircular.

TOTAL HOURS :60

COURSE OUTCOMES

At the end of this course students will be able to:

CO1: Solve the Differential Equations and its applications in engineering problems.
CO2: Apply the techniques of vector calculus.
CO3: Solve many Engineering problems that can be transformed in to problems involving ODE and integrals. Laplace transforms method and complex analytic methods can be used for solving theorem.
CO4**:** Know the fundamentals of complex analytic functions and its properties.
CO5: Gain knowledge in evaluating improper integrals using Residue theorem.
CO6: Understand Cauchy's integral formulae and Taylor's expansions with simple problems etc.

TEXT BOOKS

1.Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley &Sons,2015

2.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2015.

3.C B Gupta and S R Singh and Mukesh Kumar, Engineering Mathematics for first year,Tata McGraw-Hill,1st edition, 2015.

4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 10th edition, 2015.

5.Dr.M.K.Venkatraman, Engineering Mathematics volume-1, The National Publishing company,4th Edition,2010.

CO's- PO's & PSO's MAPPING

	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	1	2	-	-	-	2	1	-	1	2	2	-	-	-
CO2	3	3	1	1	3	1	2	1	1	1	2	2	-	-	-
CO3	3	3	2	1	3	1	3	1	1	1	2	3	-	-	-
CO4	3	3	2	2	3	2	2	1	1	1	2	3	-	-	-
CO5	2	2	1	-	3	1	2	1	1	1	3	3	-	-	-
Avg	2.8	2.4	1.6	0.8	2.4	1	2.2	1	0.8	1	2.2	2.6	-	-	-

APHT1101	PHYSICS	L	T	P	C	TOTAL MARKS
		3	0	0	3	100

PREREQUISITES: School Physics

COURSE OBJECTIVES

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT 1: MECHANICS & PROPERTIES OF MATTER 9

Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical coordinates Elasticity – Stress-strain diagram and its uses – twisting couple - torsion pendulum: theory and experiment

UNIT 2: WAVES AND FIBER OPTICS 9

Oscillatory motion – forced and damped oscillations Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance. Lasers population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Solid state ,Gas laser, Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical

fibres (material, refractive index, mode) – Application in Communication

UNIT 3: ELECTRICAL PROPERTIES OF MATERIALS 9

Classical free electron theory-Expression for Electrical conductivity-thermal conductivity-expression- Wiedmann Franz law- success and failure-electrons in metals-Particle in three dimensional box- degenerate state- Fermi Dirac Statistics-Density of Energy states-Electron in periodic potential-Bloch Theorem- Metals and Insulators-Energy bands in solids-Effective mass of electron- Concept of holes

UNIT 4: THERMAL PHYSICS 9

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT 5: QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

TOTAL HOURS :45

COURSE OUTCOMES

Upon completion of this course the students will:

CO1: Gain knowledge on the basics of mechanics and properties of matter and its applications,
CO2: Acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics
CO3: Have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion of joints and heat exchangers,
CO4: Get knowledge on advanced physics concepts of quantum theory and its applications in tunnelling microscopes
CO5: Understand the basics of electrical properties of materials and the classification of materials based on band theory.

TEXT BOOKS

1. Rajendran.V," Engineering Physics", Tata McGraw-Hill, 2019.
2. Bhattacharya, D.K. & Poonam, T. "Engineering Physics", Oxford University Press, 2015.
3. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
4. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.
5. Brij Lal and N.Subramaniam,," Properties of Matter ,S. Chand & Co., New Delhi. New Edition , 2017.

REFERENCES

1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'.W.H.Freeman, 2007.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	-	1	1	-	-	-	-	-	-	-	-	-

2	3	2	2	-	1	1	-	-	-	-	-	-	-	-	-
3	3	2	2	-	1	1	-	-	-	-	-	-	-	-	-
4	3	-	2	2	2	1	-	-	-	-	-	-	-	-	-
5	3	1	-	-	1	3	-	-	-	-	-	-	-	-	-
AVG	3	1.75	2	2	1.2	1.4									

ACHT1101	**ENVIRONMENTAL SCIENCE**	**L**	**T**	**P**	**C**	**TOTAL MARKS**
		3	**0**	**0**	**3**	**100**

PREREQUISITES: None

COURSE OBJECTIVES

- To study the nature and the facts about environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth‟s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT 1: ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity-definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT 2: ENVIRONMENTAL POLLUTION 9

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO2, NOX, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

Actual Activities:

- Plantation
- Shutting down the fans and ACs of the campus for an hour or so
- Drive for segregation of waste

UNIT 3: NATURAL REOURCES 9

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins – Biochemical degradation of pollutants, Bioconversion of pollutants.
Field study of local area to document environmental assets – river/forest/grassland/hill/mountain.

UNIT 4: SOCIAL ISSUES AND THE ENVIRONMENT 9

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark). Enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquake, cyclone and landslides. Public awareness.

Awareness Activities:

(i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste.

(ii) Lectures from expert

UNIT 5: HUMANPOPULATION ANDTHE ENVIRONMENT 9

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology in environment and human health – Case studies.

TOTAL HOURS :45

COURSE OUTCOMES

Upon completion of the course, the students will be able to:

CO1: Create public awareness of environment at infant stage.

CO2: Understand the importance of Environmental pollution and Natural resources.

CO3: Solve social issues related to the sustainable Environment.

CO4: Gain knowledge on human rights and women and child welfare programmes.

TEXT BOOKS

1.Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2014.

2.Benny Joseph, "Environmental Science and Engineering", Tata Mc Graw-Hill, New Delhi, 2017.

REFERENCES

1.R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standard", Vol. I and II, Enviro Media,2011.

2.Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2007.

3.Dharmendra S. Sengar, "Environmental law", Prentice Hall of India PVT LTD, New Delhi, 2007.

4.Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press 2016.

COs- PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-

ACST1101	COMPUTER PROGRAMMING	L	T	P	C	TOTAL MARKS
		3	0	0	3	100

PREREQUISITES: None

COURSE OBJECTIVES

- Introduction of Algorithms and Programming Concepts
- Writing Arithmetic Expressions and operator precedence in C and Python
- Understand array data structures and strings
- Sorting and Searching Algorithms and introduction to complexity
- Understand Functions and Recursion
- Understand Structures and Pointers

UNIT 1: INTRODUCTION TO PROGRAMMING 9

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
Idea of Algorithm: steps to solve logical and numerical problems.
Representation of Algorithm: Flowchart/Pseudo code with examples.
From algorithms to programs; source code, variables (with data types)variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

UNIT 2: ARITHMETIC EXPRESSIONS, ARRAYS AND STRINGS 9

Conditional Branching and Loops (using C and Python). Writing and evaluation of conditionals and consequent branching Iteration and loops -Arrays (1-D, 2-D),Character arrays and Strings (using C) List, Tuple, Dictionary, Strings(using Python)

UNIT 3: BASIC ALGORITHMS 9

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs.

UNIT 4: FUNCTION (USING C AND PYTHON) AND RECURSION 9

Functions (including using built in libraries), Parameter passing in functions, call by value Passing arrays to functions: idea of call by reference- Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT 5: STRUCTURE AND POINTERS 9

Structures, Defining structures and Array of Structures, Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list.

TOTAL HOURS :45

COURSE OUTCOMES

The course will enable the students to :

CO1: Formulate simple algorithms, write and debug programs in C and Python for arithmetic and logical problems.
CO2: Implement conditional branching, iteration and recursion.
CO3: Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO4: Use arrays, pointers and structures to formulate algorithms and programs.

CO5: Apply programming to solve matrix operations, searching and sorting problems

TEXT BOOKS

1.FlorianDedov,"Python Bible for Beginners", Kindle Edition, 2019
2.JamesTudor,"Python Programming for Beginners", Kindle Edition, 2019
3.JensGustedt,"Modern C", Manning Publications, 2019
4.KamranAmini,"Extreme C", Kindle Edition, 2019
5.Guido van Rossum and Fred L. Drake Jr," An Introduction to Python"- Revised and updated for Python 3.2", Network Theory Ltd., 2011.

REFERENCE BOOKS

1.RobertSedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd.,2016.
2.Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
3.John V Guttag, "Introduction to Computation and Programming Using Python", MIT Press, 2013

COs- PO's & PSO's MAPPING

\CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	-
2	3	3	3	3	2	-	-	-	-	-	2	2	3	-	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
6.	2	2	-	-	2	-	-	-	-	-	1	-	2	-	-
Avg.	2	3	3	3	2	-	-	-	-	-	2	2	3	3	-

APHL1101	PHYSICS LABORATORY	L	T	P	C	Total Marks
		0	0	4	2	100

PREREQUISITES: None

C COURSE OBJECTIVES

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any Seven)

1(a) Determination of wavelength, and particle size using Laser
(b) Determination of acceptance angle in an optical fiber.
2. Determination of Young's modulus by non-uniform bending method
3. Determination of thermal conductivity of a bad conductor – Lee's Disc method
4. RC coupled Oscillator
5. Ultrasonic Interferometer-Determination of Velocity of Ultrasonic waves and compressibility of the given liquid
6. Determination of band gap of a semiconductor
7. LC circuit and LCR circuit
8. Measurement of speed of light on a table top using modulation
9. Experiments on electromagnetic induction and electromagnetic breaking.

TOTAL HOURS :60

COURSE OUTCOMES

Upon completion of the course, the students will be able to:

CO1: Apply the concepts and principles of elasticity, optics and Thermal properties for Engineering Applications.

TEXT BOOKS

1. Jacob Fraden, "Handbook of Modern Sensors Physics design and application", Springer, AIP press.2018.
2. Albert D. Helfrick& William D. Cooper, "Instrumentation & Measurement Techniques" (PHI) Edition,2017.
3. C.V. Madhusudhana Rao, V. Vasanth Kumar ,"Engineering Physics lab Manual", Scitech Publications (India) Pvt. Ltd, 4th Edition,2019.
4. S. Stella Mary, 'Engineering Physics Lab Manual' RK Publisher, 2015.
5. Dr Ruby Das , C S Robinson, Rajesh Kumar ,'A Textbook of Engineering Physics Practical' Kindle Edition, 2018.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	2.4	2.6	1	1										

		L	T	P	C	Total Marks
ACSL1101	COMPUTER PROGRAMMING LABORATORY	0	0	4	2	100

PREREQUISITES: The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

C COURSE OBJECTIVES

- To study the peripherals of a computer system and trouble shoot it.
- To understand the concepts of programming
- To apply programming techniques to solve numerical problems
- To understand the concept of recursion, sorting and searching techniques.

Tutorial 1: Study of Peripheral of Computer System
Lab 1: Identify the peripherals of a computer, components in a CPU and its functions.

Tutorial 2: Hardware & Software Troubleshooting
Lab 2: To identify improper assembly or defective peripherals and system software problems.

Tutorial 3: Problem solving using computers:
Lab 3: Familiarization with programming environment

Tutorial 4: Variable types and type conversions:
Lab 4: Simple computational problems using arithmetic expressions

Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures

Tutorial 6: Loops, while and for loops.
Lab 6: Iterative problems e.g., sum of series

Tutorial 7: 1D Arrays: searching, sorting:
Lab 7: 1D Array manipulation

Tutorial 8: 2D arrays and Strings
Lab 8: Matrix problems, String operations

Tutorial 9: Functions, call by value:
Lab 9: Simple functions

Tutorial 10 & 11: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 10 and 11: Programming for solving Numerical methods problems

Tutorial 12: Recursion, structure of recursive calls
Lab 12: Recursive functions

Tutorial 13: Pointers, structures and dynamic memory allocation
Lab 13: Pointers and structures

TOTAL HOURS :60

COURSE OUTCOMES

The course will enable the students to:

CO1: Formulate the algorithms and translate it into Programs and debug it.
CO2: Write iterative as well as recursive programs
CO3: Represent data in arrays, strings and structures and manipulate them through a program
CO4: Declare pointers of different types and use them in defining self- referential structures.
CO5:Choose the appropriate searching and sorting technique depending on the problem given.

REFERENCE BOOKS

1. Fernandez, Irisini,"Python Programming Workbook: Practice in problem Solving (with solutions)",Kindle Edition,2018
2. YashavantKanetkar, AdityaKanetkar, "Let us Python",BPB Publications, 2019.

COs- PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	3	-	-	-	-	-	3	2	3	3	-
2	3	3	3	3	3	-	-	-	-	-	3	2	3	-	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
4	3	2	-	2	2	-	-	-	-	-	1	-	3	-	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
6	2	-	-	-	2	-	-	-	-	-	1	-	2	-	-
AVg.	2	3	3	3	2	-	-	-	-	-	2	2	3	3	-

III SEMESTER

		L	T	P	C	TOTAL
AMAT2103	TRANSFORM & DISCRETE MATHEMATICS	3	1	0	4	100

PRE-RERQUISITES:
Nil

Course Objective:
The objective of this course is to familiarize the prospective engineers with techniques in Laplace Transform, Fourier transforms, Sets, relations and functions , Propositional Logic , Partially ordered sets. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

TRANSFORM CALCULUS

MODULE 1: **18**
Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method.

MODULE 2: **18**
Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications.

DISCRETE MATHEMATICS

MODULE 3: SETS, RELATIONS AND FUNCTIONS: **18**
Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.

MODULE 4: PROPOSITIONAL LOGIC: **18**
Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.

MODULE 5 : PARTIALLY ORDERED SETS: **18**
Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices.-Algebraic structures with one binary operation – semigroup,monoid and group. Cosets, Lagrange's theorem, normal subgroup,homomorphic subgroup. Congruence relation and quotient structures.Error correcting code. Algebraic structures with two binary operations-ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).

Course Outcomes

The students will learn:

CO 1 - The mathematical tools needed in evaluating laplace ,fourier transforms and theirusage.

CO 2 - The effective mathematical tools for the solutions of setsrelations,functions,Propositional Logic , Partially ordered sets that model physicalprocesses.

CO 3 - The tools of transforms and discrete mathematics are used in various techniques dealing Engineering.

Textbooks/References:

- Erwin Kreyszig., *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, (2006).
- Bali N.P and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, Reprint(2010).
- Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers, 35th Edition(2000).
- Veerarajan T., *Engineering Mathematics*, Tata McGraw-Hill, New Delhi(2008).
- Dr.Balaji G., *Engineering Mathematics*, Volume II ,Bharathi Publishers, 4th edition(2017)
- Dr.Balaji G.,*Transforms and Partial Differential equation*, Bharathi Publishers, 9th edition (2013)

Textbooks/References:

- Liu C.L., *Elements of discrete mathematics*, 2nd ed., Tata mcgraw-hill(2000).
- Penner R.C., *Discrete mathematics: proof techniques and mathematical structures*, World scientific(1999).
- Graham R.L, Knuth D.E, and Patashnik O., *Concrete mathematics*, 2nd ed., Addison-wesley(1994).
- Rosen K.H., *Discrete mathematics and its applications*, 6th ed., Tata mcgraw-hill(2007).
- Hein J.L., *Discrete structures, logic, and computability*, 3rd ed.,Jones and bartlett, 2010.
- Deo N., *Graph theory*, Prentice hall of india(1974).
- Lipschutz S and Lipson M.L, *Schaum's outline of theory and problems of discrete mathematics*, 2nd ed., Tata mcgraw-hill(1999).
- Tremblay J.P and Manohar R.P, *Discrete mathematics with applications to computer science*, Tata mcgraw-hill(1997).
- Balaji G ,*Discrete Mathematics*, Bharathi publishers, 9th edition(2013).

COs- PO's & PSO's MAPPING

	PO 01	PO 02	PO 03	PO '04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO2	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO3	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO4	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO5	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
Avg	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-

	ENGINEERING GEOLOGY	L	T	P	C	TOTAL
ACIT2101		**3**	**0**	**0**	**3**	**100**

PRE-RERQUISITES:

Nil

Course Objective:
At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge inprojects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundations.

MODULE 1 PHYSICALGEOLOGY
Geology in civil engineering – branches of geology – structure of earth and its composition – weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

MODULE 2 MINEROLOGY
Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clayminerals.

MODULE 3 PETROLOGY
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks.Engineering properties of rocks.Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

MODULE 4 STRUCTURAL GEOLOGY ANDGEOPHYSICALMETHODS
Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations. Tests on rocks and bearing capacity of rocks

MODULE 5 APPLICATION OF GEOLOGICALINVESTIGATIONS
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings - Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.

COURSE OUTCOMES:
The students completing this course
CO1 Will be able to understand the importance of geological knowledge such asearth, earthquake, Weathering and works of various geological agencies.
CO2 Will gain knowledge about properties of minerals.
CO3 Develop knowledge about types of rocks and their uses.
CO5 Will understand the methods of geological investigations.
CO6 Will understand the application of geological investigation in projects such as dams, tunnels, reservoirs and road cuttings.

TEXT BOOKS:
1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, NewDelhi,2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt.Lt,2010.
3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad2011.
4. ChennaKesavulu N. "Textbook of Engineering Geology", Macmillan India Ltd.,2009.
5. Parbin Singh. A "Text book of Engineering and General Geology", Katson publishinghouse,Ludhiana2009.

REFERENCES:
1. Muthiayya, V.D. " A Text of Geology", Oxford IBH Publications,Calcutta,1969
2. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London,2010.
3. Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad2011.
4. Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, NewDelhi,1988.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2	2	2			2
PO2	Problem analysis			2	2	3	2
PO3	Design / development of solutions			3		3	3
PO4	Investigation		2	3	3	3	3
PO5	Modern Tool Usage		2		2		2
PO6	Individual and Team work		2	2		2	2
PO7	Communication					1	1
PO8	Engineer and Society	2			2	2	2
PO9	Ethics				2	2	2
PO10	Environment and Sustainability	2			2	2	2
PO11	Project Management and Finance				2	2	2
PO12	Life Long Learning				2	2	2
PSO1	Knowledge of Civil Engineering discipline		2		2	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation				2	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues			2		2	2

	STRENGTH OF MATERIALS 1	L	T	P	C	TOTAL
ACIT2102		3	1	0	4	100

PRE-RERQUISITES:

ACIT 1101-Engineering Mechanics

OBJECTIVES:

- To learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyse a complex two dimensional state of stress and plane trusses

MODULE 1 STRESS AND STRAIN 18

Stress and strain at a point – Tension, Compression, Shear Stress – Hooke's Law – Relationship among elastic constants – Stress Strain Diagram for Mild Steel, TOR steel, Concrete – Ultimate Stress – Yield Stress – Factor of Safety – Thermal Stresses– Compound Bars.

MODULE 2 SHEAR AND BENDING IN BEAMS 18

Beams and Bending- Types of loads, supports – Shear Force and Bending Moment Diagrams for statically determinate beam with concentrated load, UDL, uniformly varying load. Theory of Simple Bending – Analysis of Beams for Stresses – Stress Distribution at a cross Section due to bending moment and shear force for Cantilever, simply supported and overhanging beams with different loading conditions - Flitched Beams.

MODULE 3 DEFLECTION 18

Double integration method - Macaulay's method - Area moment method - Conjugate beam method for computation of slopes and deflections of determinant beams.

MODULE 4 TORSION **18**

Torsion of Circular and Hollow Shafts – Elastic Theory of Torsion – Stresses and Deflection in Circular Solid and Hollow Shafts – combined bending moment and torsion of shafts - Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – Leaf Springs – Springs in series and parallel – Design of buffer springs.

MODULE 5 COMPLEX STRESSES **18**

2 D State of Stress – 2 D Normal and Shear Stresses on any plane – Principal Stresses and Principal Planes – Mohr's circle - Thin Cylinders and Shells

COURSE OUTCOMES:

The students will be able to

CO 1 - Understand the concepts of stress and strain.
CO 2 - Determine Shear force and bending moment in beams and understand theory of simple bending.
CO 3 - Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
CO 4 - Apply basic equation of torsion in design of circular shafts and helical springs.
CO 5 - Analyze principal stresses, principal planes, thin cylinders and shells.

TEXT BOOKS:

1. Rajput. R.K., *Strength of Materials*, S.Chand and Co, New Delhi(2007).
2. Bhavikatti S., *Solid Mechanics*, Vikas publishing house Pvt. Ltd, New Delhi(2010).

REFERENCES :

1. Gambhir M.L., *Fundamentals of Solid Mechanics*, PHI Learning Private Limited., NewDelhi, (2009).
2. Timoshenko.S.B. and Gere .J.M., *Mechanics of Materials*, Van Nos Reinbhold, New Delhi(1995).
3. Vazirani V.N and Ratwani .M.M., *Analysis of Structures*, Vol I Khanna Publishers, New DelhI(1995).
4. Junnarkar S.B. and Shah H.J., *Mechanics of Structures*, Vol I, Charotar Publishing House, New Delhi(1997).
5. Ugural. A.C., *Mechanics of Materials*, Wiley India Pvt. Ltd., New Delhi(2013).

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	2	2	2	2	2	2
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and	1	1	1	1	1	1
PO8	Ethics	3	3	3	3	3	3
PO9	Individual and Team work	2	2	2	2	2	2
PO10	Communication	3	3	3	3	3	3
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							

PSO1	Knowledge of Civil engineering discipline	3	3	3	3	3	3
PSO2	Civil Engineering Performance Evaluationand coordination	3	3	3	3	3	3
PSO3	Conceptualization of Civil Engineering Systems	3	3	3	3	3	3

ACIT2103	CONSTRUCTION MATERIALS	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-RERQUISITES:

Nil

OBJECTIVES:

To introduce students to various materials commonly used in civil engineering construction and their properties.

MODULE 1 STONES – BRICKS 18

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks - Cement, Concrete blocks – Light weight concreteblocks.

MODULE 2 LIME – CEMENT – AGGREGATES –MORTAR BLOCKS 18

Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Fineness– Soundness and consistency – Setting time – Industrial byproducts – Fly ash – Aggregates – Natural stone aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading – Sand Bulking.-M Sand

MODULE 3 CONCRETE 18

Concrete – Ingredients – Manufacturing Process – Batching plants – RMC – Properties of fresh concrete – Slump – Flow and compaction Factor – Properties of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – High Strength Concrete and HPC – Self compacting Concrete – Other types of Concrete – Durability of Concrete. Stress -strain interpretation of tensile stress

MODULE 4 TIMBER AND OTHER MATERIALS 18

Timber – Market forms – Industrial timber– Plywood – Veneer – Thermacole – Panels of laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumens, Plastics.

MODULE 5 MODERN MATERIALS 18

Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories - Composite materials – Types – Applications of laminar composites – Fibre textiles – Geomembranes and Geotextiles for earth reinforcement.

OUTCOMES:

On completion of this course the students will be able to

CO 1 Identify the good quality of materials for construction.

CO2 Design the concrete mixes for different exposure conditions

CO3 Understand material properties of cement and aggregates.

CO4 Study the market forms of timber and steel.

CO5 Assess the properties of building materials

TEXT BOOKS:

1. Varghese P.C., *Building Materials*, PHI Learning Pvt. Ltd, New Delhi(2012).
2. Rajput. R.K., *Engineering Materials*, S. Chand and Company Ltd.(2008).
3. Shetty M.S., *Concrete Technology (Theory and Practice)*, S.Chand and Company Ltd.(2008).
4. Gambhir M.L., *Concrete Technology*, 3rd Edition, Tata McGraw Hill Education(2004).
5. Duggal.S.K., *Building Materials*, 4th Edition, New Age International (2008).

REFERENCES:

1. Jagadish K.S., *Alternative Building Materials Technology*, New Age International(2007).
2. Gambhir M.L., and Neha Jamwal., *Building Materials, products, properties and systems* ,Tata McGraw Hill Educations Pvt. Ltd, New Delhi(2012).
3. *IS456 – 2000: Indian Standard specification for plain and reinforced concrete*(2011).
4. *IS4926–2003 : Indian Standard specification for ready–mixed concrete*(2012).
5. *IS383–1970: Indian Standard specification for coarse and fine aggregate from naturalSources for concrete*(2011).

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	3	3	2	2	2
PO2	Problem analysis	2				3	2
PO3	Design / development of solutions					2	1
PO4	Investigation	3	2	2		3	2
PO5	Modern Tool Usage					2	1
PO6	Engineer and Society	2				2	1
PO7	Environment and Sustainability	2	2	3			2
PO8	Ethics						
PO9	Individual and Team work					2	1
PO10	Communication						
PO11	Project Management and Finance			2	2	3	2
PO12	Life Long Learning	2	2			2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation				3	3	2
PSO3	Conceptualization and evaluationof engineering solutions to Civil Engineering Issues		2	2		3	2

ACIT2104	Fluid Mechanics & Machinery	L	T	P	C	TOTAL
		3	0	1	4	100

PRE-RERQUISITES:
APHT1101-Engineering Physics

OBJECTIVES:

- To understand the basic properties of the fluid kinematics, fluid dynamics and to analyse and appreciate the complexities involved in solving the fluid flow problems.

MODULE 1 FLUID PROPERTIES AND FLUIDSTATICS 18

Fluid – definition, distinction between solid and fluid - MODULEs and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers and pressure gauges- forces on planes – centre of pressure – buoyancy and floatation.

MODULE 2 FLIUD KINEMATICS AND DYNAMICS 18

Fluid Kinematics - Flow visualization - lines of flow - types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- Equation of streamline - stream function - velocity potential function - circulation - flow net. Fluid dynamics - equations of motion - Euler's equation along a streamline - Bernoulli's equation – applications - Venturi meter, Orifice meter and Pitot tube. Linear momentum equation and its application.

MODULE 3 FLOW THROUGHPIPES 18

Viscous flow - Shear stress, pressure gradient relationship - laminar flow between parallel plates - Laminar flow through circular tubes (Hagen Poiseulle's) - Hydraulic and energy gradient - flow through pipes - Darcy - Weisbach's equation - pipe roughness -friction factor- Moody's diagram- Major and minor losses of flow in pipes - Pipes in series and in parallel.

MODULE4 TURBINES

Impact of Jet on vanes - Turbines - Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

MODULE5 PUMPS

Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps: Gearpump.

COURSE OUTCOMES:

At the end of the course, students will have a complete knowledge of

CO1 Demonstrate the difference between solid and fluid, its properties and behaviour in static conditions.

CO2 Apply the conservation laws applicable to fluids and its application through fluid kinematics and dynamics.

CO3 Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.

CO4 Explain the concept of boundary layer and its application to find the drag force excreted by the fluid on the flat solid surface.

CO5

TEXT BOOKS*:*

1.Modi P.N and Seth., *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House New Delhi(2003).

2.Ramamrutham S., *Fluid Mechanics and Hydraulics and Fluid Machines*, Dhanpat Raiand Sons, Delhi(2001).

3. Jain. A.K., *Fluid Mechanics*, Khanna Publishers, Delhi(2010).

REFERENCES:

1.Bansal R.K., *Fluid Mechanics and Hydraulics Machines*, 5th edition, LaxmiPublications Pvt. Ltd, New Delhi(2008).
2.Streeter V.L., and Wylie E.B., *Fluid Mechanics*, McGraw Hill(2000).
3.Fox W.R. and McDonald A.T., *Introduction to Fluid Mechanics*, John-Wiley and Sons, Singapore(1995).
4.Jain A. K., *Fluid Mechanics*, Khanna Publishers(2010).
5.Roberson J.A and Crowe C.T., *Engineering Fluid Mechanics*, Jaico Books Mumbai, (2000).
6.White, F.M., *Fluid Mechanics*, Tata McGraw Hill, 5th Edition, New Delhi(2003).

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	2	2	2	3	3	2
PO3	Design / development of solutions	1	1	3	3	2	3
PO4	Investigation	1	1	2	2	2	2
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	2	2	2	3	3	2
PO7	Environment and Sustainability	2	2	2	2	2	2
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	1	1	1	1	1	1
PO10	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	3	3	2
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	1	1	2	3	3	3

ACII1101	Internship	L	T	P	C	TOTAL
		0	0	2	1	100

PRE-REQUISITES:
All Program Core and Elective Courses

OBJECTIVES:

- To train the students in field work so as to have a firsthand knowledge of practical problems in carrying out engineering tasks. To develop skills in facing and solving the field problems

STRATEGY:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:
At the end of the course the student will be able to understand

CO1- The intricacies of implementation textbook knowledge intopractice
CO2 - The concepts of developments and implementation of new techniques.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome			Overall Correlation of Cos to POs
		CO1	CO2	CO3	
PO1	Knowledge of Engineering Sciences	3	3	2	3
PO2	Problem analysis	1	3	2	2
PO3	Design/development of solutions	1	1	2	1
PO4	Investigation	3	3		3
PO5	Modern Tool Usage				
PO6	Individual and Teamwork	3	3	2	3
PO7	Communication	2		2	2
PO8	Engineer and Society	2		2	2
PO9	Ethics	2		2	2
PO10	Environment and Sustainability	1	1	1	1
PO11	Project Management and Finance	1	1	1	1
PO12	Life Long Learning	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline	3	3	1	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	1	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	1	3

ACIL2101	Strength of Materials Lab	L	T	P	C	TOTAL
		3	0	1	4	100

PRE-RERQUISITES:
ACIT2101 Strength of Materials I Theory

OBJECTIVES:

- To impart knowledge and skill relevant to the mechanical properties of materials subjected to different types of loading on wood and steel.

LIST OF EXPERIMENTS

1. Tension test on mild steelrod
2. Compression test on wood
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod andCharpy)
6. Hardness test on metals (Rockwell and BrinellHardnessTests)
7. Deflection test on metalbeam
8. Compression test on helicalspring
9. Deflection test on carriage spring

COURSE OUTCOMES:

CO1 Apply the knowledge of testing steel rod subjected to tension and torsion.
CO2 Explain the hardness of different metals.
CO3 Exert the knowledge about the testing of helical spring and carriage spring.
CO4 Acquire the knowledge about double shear test on metal and impact test on

metal.
CO5 Obtain the practical knowledge about the deflection of the beam

REFERENCES:

1. IS 432(Part I) -1992 – Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement
2. Rajput.R.K. Strength of Materials, S.Chand& Company Ltd., New Delhi 2014.

COs- PO's & PSO's MAPPING

PO/PSO		**Course Outcome**					**Overall Correlation of CO s to POs**
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	2	2	2	2	2	2
PO3	Design / development of solutions						
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	3	3	3	3	3	3
PO6	Individual and Team work	3	3	3	3	3	3
PO7	Communication	2	2	2	2	2	2
PO8	Engineer and Society	3	3	3	3	3	3
PO9	Ethics						
PO10	Environment and Sustainability						
PO11	Project Management and Finance						
PO12	Life Long Learning	2	2	2	2	2	2
PSO1	Knowledge of Civil engineering discipline	3	3	3	3	3	3
PSO2	Civil Engineering Performance Evaluation and coordination	3	3	3	3	3	3
PSO3	Conceptualization of Civil Engineering Systems	3	3	3	3	3	3

ACIL2102	**Construction Materials Lab**	**L**	**T**	**P**	**C**	**TOTAL**
		3	**0**	**1**	**4**	**100**

PRE-RERQUISITES:
ACIT2103 Construction Materials

OBJECTIVES:
To facilitate the understanding of the behavior of construction materials.

LIST OF EXPERIMENTS

I. TEST ON CEMENT
1. Determination of fineness
2. Determination of consistency
3. Determination of initial and final setting time

4. Determination of specific gravity

II. TEST ON FINE AGGREGATES
5. Grading of fine aggregates
6. Test for specific gravity
7. Compacted and loose bulk density of fine aggregate

III. TEST ON BRICKS 12
8. Test for compressive strength
9. Test for Water absorption
10. Determination of Efflorescence

IV. TEST ON COARSE AGGREGATE
11. Determination of specific gravity
12. Determination of impact value
13. Determination of aggregate crushing value

V. TEST ON CONCRETE
14. Test for slump
15. Test for Compressive strength

COURSE OUTCOMES:

CO1 Find the fineness, specific gravity, initial and final setting time of cement.
CO2 Find the grading, specific gravity and density of fine aggregate.
CO3 Find the compressive strength, water absorption and efflorescence of bricks.
CO4 Find the specific gravity, impact value, crushing value, of
coarse aggregate.
CO5 Find the slump of fresh concrete and compressive strength of hardened concrete

REFERENCES:

1. IS 4031 (Part 1) – 1996 – Indian Standard Codes.
2. IS 4031 (Part 3 and Part 5) – 1988
3. IS 2386 (Part 1 to Part 6) – 1963
4. IS 383– 2016 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions						
PO4	Investigation						
PO5	Modern Tool Usage	3	3	3	3	3	3
PO6	Individual and Team work	2	2	2	2	2	2
PO7	Communication						
PO8	Engineer and Society						

PO9	Ethics						
PO10	Environment and Sustainability	1	1	1	1	1	1
PO11	Project Management and Finance						
PO12	Life Long Learning						
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIIL2103	**Fluid Mechanics & Machinery (Practical)**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**4**	**2**	**100**

PRE-RERQUISITES:

ACIT 2104 Fluid Mechanics & Machinery (Theory)

OBJECTIVES:

- Students should be able to verify the principles studied in theory by performing the experiments in lab.

LIST OF EXPERIMENTS

1. Flow through Venturimeter.
2. Flow through Orificemeter
3. Calibration of Rotometer
4. Determination of Friction Coefficient in pipes.
5. Flow through Orifices.
6. Flow through Mouthpiece.
7. Flow through Notches.
8. Determination of loss coefficients for pipe fittings.
9. Flow through variable duct area - Bernoulli‟s Experiment(Demonstration only)
10. Characteristics of Pelton Wheel turbine.
11. Characteristics of Francis Characteristics of Centrifugal pumps.
12. Characteristics of Submersible pumps.
13. Characteristics of Reciprocating pumps.
14. Characteristics of Gear pump.
15. Characteristics of Self priming pumps.
16. Characteristics of Pelton turbine.
17. Characteristics of Kaplan turbine.
18. Determination of Metacentric height.

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 Measure flow in pipes.
CO2 Determine frictional losses
CO3 Determine the performance characteristics of pumps
CO4 Determine the performance characteristics of turbines
CO5 Understand the Bernoulli’s equation

REFERENCES:

1. SarbjitSingh."Experiments in Fluid Mechanics", Prentice Hall of India Pvt. Ltd, Learning Private Limited, Delhi,2009.
2. "Hydraulic Laboratory Manual", Centre for Water Resources, Anna University,2004.
3.Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House,New Delhi,2000.
4.Subramanya K. "Flow in open channels", Tata McGraw Hill Publishing. Company,2001.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	3	3	3	3	3
PO2	Problem Analysis	2	2	3	3	3	3
PO3	Design / development of solutions	1	1	2	2	2	2
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	2	2	2	2	2	2
PO7	Environment and Sustainability	2	2	2	2	2	2
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	2	2	3	3	3	2
PO10	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	2	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	1	1	2	2	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	1	1	1	1	1	1

SEMESTER IV

ACIT2105	Construction Technology	L	T	P	C	TOTAL
		0	0	4	2	100

PRE-RERQUISITES:
ACIT 2103 Construction Materials

OBJECTIVES:

- Students should be able to understand the vairous components of buildings and preventive methods of construction faults

MODULE 1 COMPONENTS OF BUILDING AND TREATMENT
Partition wall and Cavity wall, Composite Masonry, Doors, Windows, Ventilators, Stairs, Lift, Ramps , Escalators, Termite Proofing, Fire Treatment and Water Proofing

MODULE 2 PLUMBING AND SANITATION
Material and Types of service pipes, Pipes and Traps, Storage Tanks, Septic Tanks, Soak Pits

MODULE 3 FLOORING
Types, Floor Finishes, Laying Methods.

MODULE 4 PLASTERING, POINTING AND PAINTING
Plastering Methods, Specifications, Types of Pointing, Painting with Different Materials

MODULE 5 FORMWORK AND SCAFFOLDING
Types of Formwork, Scaffolding, Shoring and Underpinning

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 To understand about different components of buildings
CO2 To select the suitable method of construction
CO3 To identify and rectify any fault in construction
CO4 To supervise the construction of all types of buildings
CO5 To recognise good material for construction

TEXT BOOKS:
1. Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publishing (P).Ltd., New Delhi-2, 2012.
2. Varghese,P.C., Building Construction, PHI Learning Private Limited, New Delhi -1, 2011

REFERENCES:
1. Shrivastava.U.K, Building Materials Technology, Galgotia Publications Pvt., Ltd., 2012.
2. Bhaikatti, S,S., Building Construction, Vikas Publishing House Pvt., Ltd., 2012

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	1	2	2	1	2
PO2	Problem analysis	2	-	3	3	3	3
PO3	Design / development of solutions	1	-	3	3	3	3
PO4	Investigation	3	2	2	3	3	3
PO5	Modern Tool Usage	3	2	3	2	2	2

PO6	Engineer and Society	2	2	3	1	2	2
PO7	Environment and Sustainability	2	3	2	2	1	2
PO8	Ethics	-	-	1	1	1	1
PO9	Individual and Team work	1	1	2	1	2	1
PO10	Communication	1	1	2	1	2	1
PO11	Project Management and Finance	2	2	3	2	3	2
PO12	Life Long Learning	1	1	2	1	2	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	3	3	2	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	2	3	3	2	3

ACIT2106	**Strength of Materials II**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**4**	**2**	**100**

PRE-RERQUISITES:
ACIT1101 Engineering Mechanics
ACIT2102 Strength of Materials-I

OBJECTIVES:

- To know the method of finding deflection of beams and trusses using energy theorems and to know the concept of analysing indeterminate beam
- 2.To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material

MODULE 1 ENERGY PRINCIPLES
Strain energy and strain energy density – strain energy due to axial load , shear, flexure and torsion – Castigliano's theorems – Maxwell's reciprocal theorem - Principle of virtual work – Module load method - Application of energy theorems for computing deflections in determinate beams , plane frames and plane trusses

MODULE 2 INDETERMINATE BEAMS
Concept of Analysis - Propped cantilever and fixed beams - fixed end moments and reactions – Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.

MODULE 3 COLUMNS AND CYLINDERS
Euler's column theory – critical load for prismatic columns with different end conditions – Effective length – limitations - Rankine-Gordon formula - Eccentrically loaded columns – middle third rule - core of a section – Thick cylinders – Compound cylinders

MODULE 4 STATE OF STRESS IN THREE DIMENSIONS
Stress tensor at a point – Stress invariants - Determination of principal stresses and principal planes - Volumetric strain. Theories of failure: Maximum Principal stress theory Maximum Principal strain theory – Maximum shear stress theory – Total Strain energy theory – Maximum distortion energy theory – Applicationproblems.

MODULE 5 ADVANCED TOPICS
Unsymmetrical bending of beams of symmetrical and unsymmetrical sections –curved beams – Winkler Bach formula – stresses in hooks.

COURSE OUTCOMES:
Students will be able to

CO1 - Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.
CO2 - Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.
CO3 - find the load carrying capacity of columns and stresses induced in columns and cylinders
CO4 - Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure
CO5 - Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.

TEXTBOOKS:

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand& company Ltd., New Delhi,2015.
2. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2011.
3. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol - II, Laxmi Publishing Pvt Ltd, New Delhi2017.
4. Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad, 2016

REFERENCES:

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi,2003
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata McGraw Hill Publishing company,2007.
3. Singh. D.K., " Strength of Materials", Anne Books Pvt. Ltd., New Delhi,2016
4. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi,2012

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	2	2	2	2	2	2
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and	1	1	1	1	1	1
PO8	Ethics	3	3	3	3	3	3
PO9	Individual and Team work	2	2	2	2	2	2
PO10	Communication	3	3	3	3	3	3
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil engineering discipline	3	3	3	3	3	3
PSO2	Civil Engineering Performance Evaluationand coordination	3	3	3	3	3	3
PSO3	Conceptualization of Civil Engineering Systems	3	3	3	3	3	3

ACIT2107	Surveying	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-RREQUISITES:
Nil

OBJECTIVES:

- To learn the various methods of plane and geodetic surveying to solve the real world Civil Engineeringproblems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

MODULE 1 FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING

Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging - Compass - Types of Compass - Basic Principles- Bearing – Types - True Bearing - Magnetic Bearing - Levelling- Principles and theory of Levelling – Datum- - Bench Marks – Temporary and Permanent Adjustments- Methods of Levelling- Booking – Reduction - Sources of errors in Levelling - Curvature and refraction, Survey Stations.

MODULE 2 THEODOLITE AND TACHEOMETRIC SURVEYING

Horizontal and vertical angle measurements - Temporary and permanent adjustments - Heights and distances - Tacheometer - Stadia Constants - Analytic Lens -Tangential and Stadia Tacheometry surveying - Contour – Contouring – Characteristics ofcontours Methods of contouring – Tacheometric contouring - Contour gradient – Usesof contour plan and map

MODULE 3 CONTROL SURVEYING AND ADJUSTMENT

Horizontal and vertical control – Methods – specifications – triangulation- baseline – satellite stations – reduction to centre- trigonometrical levelling – single and reciprocal observations – traversing – Gale's table. - Errors Sources- precautions and corrections classification of errors – true and most probable values - weighed observations – method of equal shifts – principle of least squares - normal equation – correlates- level nets- adjustment of simple triangulation networks.

MODULE 4 ADVANCED TOPICS IN SURVEYING

Hydrographic Surveying – Tides – MSL – Sounding methods – Three point problem – Strength of fix – astronomical Surveying – Field observations and determination of Azimuth by altitude and hour angle methods – .Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems - different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method

MODULE 5 MODERN SURVEYING

Total Station : Advantages - Fundamental quantities measured - Parts and accessories - working principle - On board calculations - Field procedure - Errors and Good practices in using Total Station GPS Surveying : Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - Hand Held and Geodetic receivers - data processing - Traversing and triangulation, Setting outcurves.

COURSE OUTCOMES :

At the end of the course the student will be able to

CO1 - Use various surveying instruments and their applications.

CO2- Determine Horizontal angle and vertical angle using different instruments.

CO3 -Assess levels with different instruments and determination of errors and triangulationnetworks.

CO4- Understand concepts of astronomical surveying and methods to determine time, longitude, latitude and Azimuth.

CO5 -Understand concept and principle of modernsurveying**.**

TEXTBOOKS :

1. Punmia.B.C., Ashok K.Jain and Arun K Jain , Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi,2005
2. Kanetkar.T.P and Kulkarni.S.V, Surveying and Levelling, Parts 1 & 2, Pune VidyarthiGrihaPrakashan, Pune,2008

3. James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", 7th Edition, McGraw Hill,2001.
4. Bannister and S. Raymond, "Surveying", 7th Edition, Longman2004.
5. Laurila, S.H. "Electronic Surveying in Practice", John Wiley and Sons Inc,1993
6. Venkatramaiah, Text book of Surveying, University press, New Delhi,2014

REFERENCES :

1. Alfred Leick, "GPS satellite surveying", John Wiley & Sons Inc., 3rd Edition,2004.
2. Guocheng Xu, "GPS Theory , Algorithms and Applications", Springer – Berlin,2003.
3. SatheeshGopi, rasathishkumar, N. madhu, "Advanced Surveying, Total Station GPS and Remote Sensing" Pearson education,2007
4. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India,2004.
5. Arora K.R.,"Surveying Vol I & II", Standard Book house, 10th Edition2008

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	3	3	3	3	3
PO2	Problem analysis	2	3	3	3	3	2
PO3	Design / development ofsolutions	3	2	3	3	3	3
PO4	Investigation	2	2	2	3	3	2
PO5	Modern Tool Usage	2	2	3	3	3	3
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment andSustainability				2	2	2
PO8	Ethics	2	2	2	2	3	2
PO9	Individual and Team work	2	2	2	3	2	2
PO10	Communication						
PO11	Project Management andFinance	2	2	2	2	2	2
PO12	Life Long Learning				2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems andinnovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering	3	3	3	3	3	3

ACIT2108	Environmental Engineering I	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-RREQUISITES:
ACHT1101 Environmental Science

OBJECTIVES:

- To equip the students with the principles and design of water treatment Modules and distribution system.

MODULE I PLANNING FOR WATER SUPPLYSYSTEM
Public water supply system -Planning - Design period Population forecasting -Water demand -Sources of water and their characteristics -Surfac and Groundwater- Impounding Reservoir -Development and selection of source - Wat quality - Characterization and standards- Impact of climate change.

MODULEII CONVEYANCE SYSTEM
Water supply -intake structures -Functions and drawings -Pipes and conduits for wate Pipe materials - Hydraulics of flow in pipes -Transmission main design -Laying, jointin and testing of pipes - Drawings appurtenances - Types and capacity of pumps -Selectio of pumps and pipematerials.

MODULE III WATER TREATMENT
Module operations and processes - Principles, functions desig and drawing of Chemical feeding, Flash mixers, flocculators, sedimentation tanks an sandfilters–Plateandtubesettlers-Disinfection-ResidueManagement-Constructio
,operation & Maintenance aspects of Water Treatment Plants.

MODULE IV ADVANCED WATER TREATMENT
Principles and functions of Aeration - Iron and manganese removal, Defluoridation an demineralization – R.O. plant - Water softening - Desalination – MBR process - Recent advances.

MODULE V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS
Requirements of water distribution -Components -Service reservoirs -Functions an drawings -Network design - Economics -Computer applications -Analysis of distributio networks -Appurtenances -operation and maintenance -Leak detection, Method Principles of design of water supply in buildings -House service connection -Fixtures an fittings -Systems of plumbing and drawings of types ofplumbing.

COURSE OUTCOMES:
The students completing the course will be able to
CO1 - Understand structure of drinking water supply systems, including water transport, treatment and distribution
CO2- design of intake structure and conveyance system for water transmission
CO3 Understand the process of conventional treatment of water and design of water treatment system.
CO4 Able to Understand and design the various advanced treatment system and knowledge about the recent advances in water treatment process
CO5 Design and evaluate water distribution system and water supply in Buildings

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, NewDelhi, 2005.
2. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, NewDelhi, 2005.
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering",Laxmi Publications Pvt. Ltd., New Delhi,2005

REFERENCES:

1. Government of India, "Manual on Water Supply and Treatment", CPHEEO,Ministr of Urban

Development, New Delhi,2003
2. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, NewDelhi 2006.

COs- PO's & PSO's MAPPING

		CO1	CO2	CO3	CO4	CO5	Overall correlation of COs to PO s
PO1	Knowledge of Engineering Sciences	2	2	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions			3	3	3	3
PO4	Investigation	2	2			2	2
PO5	Modern Tool Usage				2	2	2
PO6	Engineer and Society			3	3	3	3
PO7	Environment and Sustainability			2	3	3	3
PO8	Ethics	1	1	2	2	2	2
PO9	Individual and Team work	1	1	2	3	3	2
PO10	Communication					2	2
PO11	Project Management and Finance			2	2	2	2
PO12	Life Long Learning					3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline						
PSO2	Critical analysis of Civil Engineering problems and innovation			2	2	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues			2	2	3	2

ACIT2109	Soil Mechanics	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-RREQUISITES:
Nil

OBJECTIVES:

- To impart knowledge on behavior and the performance of saturated soil. At the end of this course student attains adequate knowledge in assessing both physical and engineering behaviour of soils, mechanism of stress transfer in two-phase systems and stability analysis of slopes.

MODULE 1 SOIL CLASSIFICATION AND COMPACTION
Nature of soil – phase relationships – Soil description and classification for engineering purposes, their significance – Index properties of soils - BIS Classification system – Soil compaction – Theory, comparison of laboratory and field compaction methods – Factors influencing compaction behaviour of soils.

MODULE 2 SOIL WATER AND WATERFLOW
Soil water – static pressure in water - Effective stress concepts in soils – capillary stress
– Permeability measurement in the laboratory and field pumping in pumping out tests – factors influencing permeability of soils – Seepage – introduction to flow nets – Simple problems. (sheet pile andweir).

MODULE3 STRESS DISTRIBUTION AND SETTLEMENT
Stress distribution - soil media – Boussinesq theory - Use of Newmarks influence chart
– Components of settlement — immediate and consolidation settlement – Terzaghi"sonedimensional

consolidation theory – computation of rate of settlement. - √t and log t methods– e-log p relationship - Factors influencing compression behaviour of soils.

MODULE4 SHEAR STRENGTH

Shear strength of cohesive and cohesionless soils – Mohr – Coulomb failure theory – Measurement of shear strength, direct shear – Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – cyclic mobility – Liquefaction.

MODULE5 SLOPE STABILITY

Slope failure mechanisms – Types - infinite slopes – finite slopes – Total stress analysis for saturated clay – Fellenius method - Friction circle method – Use of stability number - slope protection measures, Instrumentation.

COURSE OUTCOMES:

CO1 - Classify the soil and assess the engineering properties
CO2 - Understand the stress concepts in soils
CO3 - Understand and identify the settlement in soils.
CO4 - Determine the shear strength of soil
CO5 - Analyze both finite and infinite slopes.

TEXT BOOKS:

1. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", Wiley Eastern Ltd, New Delhi (India), 2000.
2. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi.2007
3. Arora K.R. "Soil Mechanics and FoundationEngineering", Standard Publishers and Distributors, New Delhi,2002.

REFERENCES:

1. McCarthy D.F. "Essentials of Soil Mechanics and Foundations". Prentice-Hall,2002. Coduto, D.P. "Geotechnical Engineering – Principles and Practices", Prentice Hallof India Pvt.Ltd, New Delhi,2002.
2. Das, B.M. "Principles of Geotechnical Engineering". Thomson Brooks / ColesLearning Singapore, 5th Edition,2002.
3. Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd.,New Delhi,2005.
4. Palanikumar. M, "Soil Mechanics", Prentice Hall of India Pvt. Ltd, Leaning Private Limited, Delhi,2013.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	3	3	2	3	3
PO2	Problem analysis	3	2	3	3	3	3
PO3	Design / development of solutions	2	3	2	3	2	2
PO4	Investigation	2	2	2	2	2	2
PO5	Modern Tool Usage	3	3	2	2	2	2
PO6	Engineer and Society	1	1	2	1	1	1
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	2	2	2	1	1	2
PO10	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	2	2	2	2	1	2

PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	2	2	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation	3	2	2	2	3	2
PSO3	Conceptualization and evaluationof Engineering solutions to Civil engineering issues	2	3	3	3	2	3

ACIL2104	**Surveying Lab**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**4**	**2**	**100**

PRE-RREQUISITES:
ACIT2107 Surveying

OBJECTIVES:
At the end of the course the student will posses knowledge about Survey field techniques.

LIST OF EXPERIMENTS:

Chain Survey

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
2. Setting out works – Foundation marking using tapes single Room and DoubleRoom

Compass Survey

3. Compass Traversing – Measuring Bearings & arriving included angles

Levelling - Study of levels and levelling staff

4. Fly levelling using Dumpy level &Tiltinglevel
5. Check levelling

Theodolite - Study of Theodolite

6. Measurements of horizontal angles by reiteration and repetition and verticalangles
7. Determination of elevation of an object using single plane method when base is accessible/inaccessible.

Tacheometry – Tangential system – Stadia system

8. Determination of TacheometricConstants
9. Heights and distances by stadiaTacheometry
10. Heights and distances by TangentialTacheometry

11. Total Station - Study of Total Station, Measuring Horizontal and verticalangles.
12. GPS – Demonstration ofGPS.

COURSE OUTCOME:
Students completing this course will acquire practical knowledge on
CO1 – Using basic survey instruments including chain/tape, compass, plane table in the field of civil engineering applications
CO2 - Determination of Distance using horizontal and vertical angles
CO3 - Determination of Elevation using horizontal and vertical angles
CO4 - Establish horizontal and vertical control points.
CO5 – Adopting GPS for measuring horizontal and vertical angles

REFERENCES:
1. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2, Pune Vidyarthi Griha

Prakashan, Pune, 2008
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2005

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	2	2	1	3	3	2
PO3	Design / development of solutions	3	3	2	2	3	3
PO4	Investigation	3			3	2	3
PO5	Modern Tool Usage	2	3	3	2	2	3
PO6	Engineer and Society	3	3	2	3	3	3
PO7	Environment and Sustainability	2	3		3	3	3
PO8	Ethics	3	3		2	2	3
PO9	Individual and Team Work	3	3	3	3	3	3
PO10	Communication	3	3		3	3	3
PO11	Project Management and Finance	3	3		3	3	3
PO12	Life Long Learning	1	1	2	1	1	1
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIL2105	Soil Mechanics Lab	L	T	P	C	TOTAL
		0	0	4	2	100

PRE-REQUISITES:
ACIT2109 Soil Mechanics

OBJECTIVES:

- At the end of the course student attains adequate knowledge in assessing both Physical and Engineering behaviour of soils through laboratory testing procedures.

LIST OF EXPERIMENTS :

1. DETERMINATION OF INDEX PROPERTIES

a. Specific gravity of soilsolids
b. Grain size distribution – Sieveanalysis
c. Grain size distribution Hydrometeranalysis
d. Liquid limit and Plastic limit tests
e. Shrinkage limit and Differential free swelltests

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

a. Field density Test (Sand replacementmethod)
b. Determination of moisture – density relationship using standard Proctor compaction test.

3. **DETERMINATION OF ENGINEERINGPROPERTIES**

a. Permeability determination (constant head and falling headmethods)
b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
c. Direct shear test in cohesion-lesssoil
d. Unconfined compression test in cohesivesoil
e. Laboratory vane Shear test in cohesivesoil
f. Tri-axial compression test in cohesion-less soil (Demonstrationonly)
g. California Bearing RatioTest

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1 - Determine the index properties of soils
CO2 - Determine the insitu density
CO3 – Determine the compaction characteristics.
CO4 - Determine the compressibility, permeability
CO5 – Determine the shear strength of soils.

REFERENCES:

1. Saibaba Reddy, E. Ramasastri, K. "Measurement of Engineering Properties of Soils", New age International (P) Limited Publishers, New Delhi,2002.
2. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York,1990.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome				Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	
PROGRAM OUTCOMES(PO)						
PO1	Knowledge of Engineering Sciences	2	1	3	1	1
PO2	Problem analysis	2	2	3	2	2
PO3	Design / development of solutions	3	3	3	2	3
PO4	Investigation	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	2	1
PO6	Engineer and Society	1	1	1	1	1
PO7	Environment andSustainability	1	1	1	1	1
PO8	Ethics	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3
PO10	Communication	1	2	1	1	1
PO11	Project Management and Finance	1	1	1	1	1
PO12	Life Long Learning	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)						
PSO1	Knowledge of Civil Engineering discipline	3	2	2	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	2	3
PSO3	Conceptualization and evaluation of Engineering solutions to Civil engineering issues	3	2	3	3	3

ACIL2106	Computer Aided Building Drawing Lab	L	T	P	C	TOTAL
		0	0	4	2	100
PRE-REQUISITES:						

AMET1101 Engineering Graphics and Design

OBJECTIVES:

- To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements .

LIST OF EXPERIMENTS

1. Principles of planning and orientation
2. Buildings with load bearing walls and RCC roof (Plan , section , elevation)
3. Buildings with sloping roof.
4. Industrial buildings – North light roof truss
5. 3D Modeling

COURSE OUTCOMES:

The students will be able to

CO1 – Plan and orient buildings

CO2 - Draft the plan, elevation and sectional views of framed buildings

CO3 - Draft the plan, elevation and sectional views of buildings with sloped roofs

CO4 - Draft plan, elevation and sectional views of industrial structures, buildings

CO5 – 3D Modeling

TEXT BOOKS:

1. Sikka V. B., A Course in Civil Engineering Drawing, 4th Edition, S.K. Kataria and Sons,1998.
2. George Omura, "Mastering in AUTOCAD 2002", BPBPublications,2002

REFERENCES:

1. Shah.M.G., Kale. C.M. and Patki. S.Y., "Building Drawing with an IntegratedApproach to Bui Environment", Tata McGraw Hill PublishersLimited,2004.
2. Verma.B.P., "Civil Engineering Drawing and House Planning", Khanna Publishers,1989
3. Marimuthu V.M., Murugesan R. and Padmini S., "Civil Engineerin Drawing-I", PratheebaPublishers,2008.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	-	2	2	2	2	2
PO3	Design / development of solutions	-	-	-	-	-	-
PO4	Investigation	-	-		2	2	2
PO5	Modern Tool Usage	2	2	2	2	2	2
PO6	Engineer and Society	-	3	3	3	3	3
PO7	Environment and Sustainability	-	-	-	-	-	-
PO8	Ethics	1	2	2	1	2	2
PO9	Individual and Team work	-	3	3	3	3	3
PO10	Communication	-	2	2	2	2	2
PO11	Project Management and Finance	-	-	-	-	-	-
PO12	Life Long Learning	1	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	2	2	2

PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	-	2	2	2	2	2

SEMESTER 5

ACIT3110	Structural Analysis I	L	T	P	C	TOTAL
		3	1	0	4	100

PRE-REQUISITES:
ACIT 1101 Engg Mechanics
ACIT 2102 Strength of Materials I
ACIT 2106 Strength of Materials II

OBJECTIVES:

- To introduce the students the basic theory and concepts of structural analysis and the classical methods for the analysis of buildings.

MODULE I STRAIN ENERGY METHOD
Determination of Static and Kinematic Indeterminacies – Analysis of continuous beams, plane frames and indeterminate plane trusses by strain energy method (up to two degree of redundancy).

MODULE II SLOPE DEFLECTION METHOD
Slope deflection equations – Equilibrium conditions - Analysis of continuous beams and rigid frames – Rigid frames with inclined members - Support settlements- symmetric frames with symmetric and skew-symmetric loadings.

MODULE III MOMENT DISTRIBUTION METHOD
Stiffness and carry over factors – Distribution and carryover of moments - Analysis of continuous Beams- Plane rigid frames with and without sway – Support settlement - symmetric frames with symmetric and skew-symmetric loadings.

MODULE IV FLEXIBLITYMETHOD
Primary structures - Compatibility conditions – Formation flexibility matrices - Analysis of indeterminate pin-jointed plane frames, continuous beams and rigid jointed plane frames by direct flexibility approach.

MODULE V STIFFNESS METHOD
Restrained structure –Formation of stiffness matrices - equilibrium condition – application in STAAD Pro-Analysis of Continuous Beams, Pin-jointed plane frames and rigid frames by direct stiffnessmethod.

COURSE OUTCOMES:
Students will be able to
CO1 - Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method
CO2 - Analyse the continuous beams and rigid frames by slope defection method.
CO3 - Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
CO4 - Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method
CO5 - Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

TEXTBOOKS:
1. Bhavikatti, S.S,Structural Analysis,Vol.1,& 2, Vikas PublishingHouse Pvt.Ltd.,NewDelhi-4,2014.
2. Bhavikatti, S.S, Matrix Method of Structural Analysis, I. K. International Publishing House Pvt.Ltd.,New Delhi-4,2014.
3. Vazrani.V.N And Ratwani, M.M, Analysis of Structures, Vol.II, KhannaPublishers, 2015.

4. Pandit G.S.and Gupta S.P.,Structural Analysis–AMatrix Approach, Tata McGrawHill Publishing CompanyLtd.,2006

REFERENCES:

1. Punmia. B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures,Laxmi Publications, New Delhi,2004.
2. William Weaver, Jrand James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors,Delhi,1995
3. Hibbeler, R.C.,Structural Analysis, VII Edition, Prentice Hall,2012.
4. Reddy.C.S, "Basic Structural Analysis",Tata McGraw Hill PublishingCompany,2005.
5. Rajasekaran. S, & G. Sankarasubramanian., "Computational StructuralMechanics", PHI Learning Pvt. Ltd,2015
6. Negi L.S.and Jangid R.S.,Structural Analysis, Tata McGraw HillPublishing Co.Ltd.2004.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	1	1	1	1	1
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT3111	Foundation Engineering	L	T	P	C	TOTAL
		3	0	0	4	100

PRE-REQUISITES:
ACIT2109 Soil Mechanics

OBJECTIVES:

- To impart knowledge on common method of sub soil investigation and design of foundation. At the end of this course student acquires the capacity to investigate the soil condition and to select and design a suitable foundation.

MODULE I SITE INVESTIGATION AND SELECTION OF FOUNDATION

Scope and course– Methods of exploration – auguring and boring – Wash boring and rotary drilling – Depth of boring – Spacing of bore hole – Sampling techniques – Representative and undisturbed sampling – methods -

Split spoon sampler, Thin wall sampler,Stationery piston sampler – Penetration tests (SPT and SCPT) - Bore log report – Data interpretation - strength parameters and Liquefaction potential - Selection of foundation based on soilcondition.

MODULE II SHALLOW FOUNDATION

Introduction – Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi‟s formula and BIS formula – factors affecting bearing capacity – problems – Bearing capacity from in-situ tests (SPT, SCPT and plate load)Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

MODULE III FOOTINGS AND RAFTS

Types of footings – Contact pressure distribution: Isolated footing – Design with axial load and bending moment using Teng's chart- Combined footings –Types and proportioning – Mat foundation – Types and applications – Proportioning – Floating foundation – Seismic force consideration – Codal Provision.

MODULE IV PILE FOUNDATION

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – static formula – dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) –Negative skin friction – uplift capacity- Group capacity by different methods (Feld‟s rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles – Capacity under compression anduplift.

MODULE V RETAINING WALLS

Plastic equilibrium in soils – active and passive states – Rankine‟s theory – cohesionless and cohesive soil – Coulomb‟s wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann Graphical method – pressure on the wall due to line load – Stability analysis of retainingwalls.

COURSE OUTCOMES:

On completing the course, the students will be able to

CO1 - Plan and execute a detailed site investigation to select geotechnical design parameters and type of foundation

CO2 - Demonstrate an ability to design shallow foundations, its component or process as per the needs and specifications.

CO3 - Design combined footings and raft foundations, its component or process as per the needs and specifications.

CO4 - Design deep foundations, its component or process as per the needs and specifications.

CO5 - Design retaining walls, its component or process as per the needs and specifications.

TEXT BOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers and Distributers Ltd., New Delhi,2007.
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", New Age International Pvt. Ltd, New Delhi, 2005. 3. Purushothama Raj.P.,
3. "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013
4. Varghese, P.C., "Foundation Engineering", Prentice Hall of India Private Limited, New Delhi,2005.

REFERENCES:

1. Das, B.M. "Principles of Foundation Engineering" 5th edition, Thompson Asia Pvt. Ltd., Singapore,2003.
2. Kaniraj, S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill Publishing company Ltd., New Delhi,2002.
3. Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd., New Delhi,2005
4. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007(Reprint)
5. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New

Delhi,2005.
6. IS 6403 : 1981 (Reaffirmed 1997) "Breaking capacity of shallow foundation", Bureau of Indian Standards, New Delhi,1998
7. IS8009 (Part1):1976 (Reaffirmed 1998) "Shallow foundations subjected to symmetrical static vertical loads", Bureau of Indian Standards, New Delhi,1999

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	2	2	3	3	2
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	2	2	2	1	2	2
PO7	Environment and Sustainability	1	2	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	1	1	1	1	1	1
PO10	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	2	2	2	2
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	2	2	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	3	3	3	3
PSO3	Conceptualization and evaluationof Engineering solutions to Civil engineering issues	3	2	2	3	3	3

ACIT3112	Waste Water Engineering	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-REQUISITES:
ACIT 2108 Water Supply Engineering

OBJECTIVES:

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

MODULEI PLANNING FOR SEWERAGE SYSTEMS

Sources of wastewater generation – Effects –Estimation of sanitary sewage flow Estimation of storm runoff – Factors affecting Characteristics and composition sewage and their significance – Effluent standards – Legislation requirements.

MODULE II SEWER DESIGN

Sewerage – Hydraulics of flow in sewers – Design period Design of sanitary and storm sewers – Small bore systems - Computer applications Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps an pipe Drainage -. Plumbing System for Buildings.

MODULE III PRIMARY TREATMENT OF SEWAGE

Objective – Selection of treatment processes – Principles, Functions, Design an Drawing of Modules - Onsite sanitation - Septic tank with dispersion - Grey wat harvesting – Primary treatment – Principles, functions design and drawing of scree grit chambers and primary sedimentation tanks – Construction, operation an Maintenance aspects.

MODULE IV SECONDARY TREATMENT OF SEWAGE

Objective – Selection of Treatment Methods – Principles, Functions, Design an Drawing of Modules - Activated Sludge Process and Trickling filter – Sequencing Batc Reactor-Membrane BioReactor-Oxidation ditches- UASB – Waste Stabilization Pond - – Reclamation and Reuse of sewage - sewage recycle in residential complex - Rece Advances in Sewage Treatment – Construction and Operation & Maintenance Sewage Treatment Plants.

MODULE V DISPOSAL OF SEWAGE AND SLUDGE MANAGEMENT

Standards for Disposal - Methods – dilution – Self purification of surface water bodies Oxygen sag curve – Lar disposal – Sludge characterization – Thickening – Sludg digestion – Biogas recovery – Sludge Conditioning ar Dewatering – disposal Advances in Sludge Treatment and disposal.

COURSE OUTCOMES:

The students completing the course will have

CO1- Understand on the characteristics and composition of sewage ,ability to estimate sewage generation and design sewer system including sewage pumping stations

CO2 - Select type of treatment system and able to perform basic design of the unit operations that are used in sewage treatment. knowledge of septic tank design

CO3 - Gain knowledge of selection of treatment process and biological treatment process

CO4 - Acquire knowledge of advance treatment technology and reuse of sewage

CO5 - Understand the, self-purification and sludge and septage disposal

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering" Vol. II, Khanna Publishers, NewDelhi, 2003.
2. Punmia, B.C., Jain, A.K., and Jain. A., "Environmental Engineering",Vol.II, Lakshmi Publications, News letter,2005.

REFERENCES:

1. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry ofUrban Development, Government o India, New Delhi,1997.
2. Metcalf & Eddy, "Wastewater Engineering" – Treatment and Reuse,Tata McGraw Hill Company, New Delhi,2003.
3. Karia G L & Christian R A, "Wastewater Treatment", Prentice Hall of India,New Delhi,2013.

COs- PO's & PSO's MAPPING

		CO1	CO2	CO3	CO4	CO5	Overall correlation of COs to PO s
PO1	Knowledge of Engineering Sciences	2	2	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions			3	3	3	3
PO4	Investigation	2	2			2	2
PO5	Modern Tool Usage				2	2	2
PO6	Engineer and Society			3	3	3	3
PO7	Environment and Sustainability			2	3	3	3
PO8	Ethics	1	1	2	2	2	2
PO9	Individual and Team work	1	1	2	3	3	2
PO10	Communication					2	2
PO11	Project Management and Finance			2	2	2	2

PO12	Life Long Learning					3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline						
PSO2	Critical analysis of Civil Engineering problems and innovation			2	2	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues			2	2	3	2

ACIT3113	Design of Reinforced Concrete Elements	L	T	P	C	TOTAL
		3	1	0	4	100

PRE-REQUISITES:
ACIT 2102 STRENGTH OF MATERIALS I

OBJECTIVES:

- To introduce the different types of design philosophies and limit state design methodologies of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian Standard Code of practice.

MODULE I METHODS OF DESIGN OF CONCRETE STRUCTURES
Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification - Design of beams by working stress method.

MODULE II LIMIT STATE DESIGN OF BEAMS
Design of singly and doubly reinforced rectangular and flanged beams – Design of RC members for combined bending shear and torsion - Design requirement for bond and anchorage as per IS code.

MODULE III LIMIT STATE DESIGN OF SLABS
Behaviour of one way and two way slabs - design of one way simply supported, cantilever and continuous slabs. Design of two-way slabs for various edge conditions.

MODULE IV LIMIT STATE DESIGN OF COLUMNS
Types of columns – design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids.

MODULE V LIMIT STATE DESIGN OF FOOTING
Design of footing for masonry and reinforced walls – design of axially and eccentrically loaded square and rectangular footings – design of combined rectangular footings for two columns only.

COURSE OUTCOMES:
The student shall be able to
CO1 - Understand the various design methodologies for the design of RC elements.
CO2 - Analyse and design of beams by limit state method for flexure, shear, bond and torsion.
CO3 - Design the various types of slabs by limit state method.
CO4 - Design columns for axial, uniaxial and biaxial eccentric loadings.
CO5 - Design of footings.

TEXTBOOKS:
1. Krishna Raju and PRanesh, Reinforced Concrete Design: IS:456-2000 Principles and Practice, New Age International Publishers,2018
2. B.C.Punmia, Arun Kumar Jain and Ashok Kumar Jain, Limit State Designof Reinforced Concrete, Laxmi Publications,2016.
3. Gambhir. M.L., Fundamentals of Reinforced Concrete Design, Prentice HallInc., 2006.

REFERENCES:

1. IS 456–2000, Indian Standard – Plain and Reinforced Concrete – Code of Practice, FourthEdition.
2. Varghese.P.C., Limit State Design of Reinforced Concrete, SecondEdition Prentice Hall Inc.,2010,
3. Unnikrishna Pillai and Devdas Menon, Reinforced Concrete Design, TataMcGraw Hill Publishing Company Ltd.,2005
4. Sinha.S.N., Reinforced Concrete Design, Second Edition, Tata McGrawHill Publishing Company,2002.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT3114	Water Resources and Irrigation Engineering	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-REQUISITES:
Nil

OBJECTIVES:

- The student is exposed to different phases in Water Resources Management and Nationa Water Policy. Further they will be imparted required knowledge on Reservoir planning, management and economic analysis including Irrigation and Irrigation management practices.

MODULE I WATER RESOURCES

Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Estimation of water requirements for irrigation and drinking- Single and multipurpose reservoir – Multi objective - Fixation of Storage capacity -Strategies for reservoir operation - Design flood-levees and flood walls.

MODULEII WATER RESOURCEMANAGEMENT

Economics of water resources planning; – National Water Policy – Consumptive and non- consumptive water use - Water quality – Scope and aims of master plan - Concept of basin as a unit for development - Water budget- Conjunctive use of surface and ground water

MODULE III IRRIGATION ENGINEERING

Need – Merits and Demerits – Duty, Delta and Base period – Irrigation efficiencies – Crop and Seasons - Crop water Requirement – Estimation of Consumptive use of water.

MODULE IV CANAL IRRIGATION

Types of Impounding structures: Gravity dam – Diversion Head works - Canal drop – Cross drainage works – Canal regulations – Canal outlets – Canal lining - Kennady"s and Lacey"s Regime theory

MODULE V IRRIGATION METHODS AND MANAGEMENT

Lift irrigation – Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub- Surface and Micro Irrigation - Merits and demerits – Irrigation scheduling – Water distribution – Participatory irrigation management with a case study

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1 Describe the national water policy structure and soil plant water characteristics
CO2 Describe the basics of requirements and estimation of crop water
CO3 Design the various types of hydraulic structure includes dams, spillways and dissipaters
CO4 Design the components of irrigation canal includes canal drops and cross drainage works
CO5 Apply the concepts of Irrigation water management, water user association for participatory irrigation management

TEXT BOOKS:

1. Linsley R.K. and Franzini J.B, "Water Resources Engineering", McGraw-Hill Inc, 2000.
2. Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009 Garg S. K., "Irrigation Engineering and Hydraulic structures", Khanna Publishers, 23rd Revised Edition, New Delhi,2009

REFERENCES:

1. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Ag International Publishers,2005
2. Chaturvedi M.C., "Water Resources Systems Planning and Management",Tata McGraw- Hill Inc., New Delhi,1997.
2. Michael A.M., Irrigation Theory and Practice, 2nd Edition, Vikas PublishingHouse Pvt. Ltd., Noida, Up,2008
3. Dilip Kumar Majumdar, "Irrigation Water Management", Prentice-Hall of India, New Delhi,2008.
4. Asawa, G.L., "Irrigation Engineering", New Age International Publishers, NewDelh 2000.

COs- PO's & PSO's MAPPING

PO/PSO		COURSE OUTCOMES:					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2	2	2	2	2	2
PO2	Problem analysis	2	3	2	2	2	2
PO3	Design/development of solutions	-	2	2	1	2	1
PO4	Investigation	2	2	1	1	2	2
PO5	Modern Tool Usage	1	1	-	1	1	1
PO6	Engineer and Society	2	2	2	3	3	2
PO7	Environment and Sustainability	2	2	2	2	2	2
PO8	Ethics	-	-	-	2	2	1
PO9	Individual and Team work	2	3	2	2	3	2
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	-	-	2	-	2	1
PO12	Life Long Learning	2	2	2	3	3	2

PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	2	2	2	2	2	2
PSO2	To enhance the ability of studentsto formulate solutions to real- world problems pertaining to sustained agricultural productivity using modern technologies.	2	2	2	2	2	2
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	2	3	2	3	3	3

ACII2102	**Internship**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**2**	**1**	**100**

PRE-REQUISITES:
All Program Core and Elective Courses

OBJECTIVES:

- To train the students in field work so as to have a firsthand knowledge of practical problems in carrying out engineering tasks.
- To develop skills in facing and solving the field problems

STRATEGY:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:
At the end of the course the student will be able to understand
CO1- The intricacies of implementation textbook knowledge intopractice
CO2 - The concepts of developments and implementation of new techniques.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome			Overall Correlation of Cos to POs
		CO1	CO2	CO3	
PO1	Knowledge of Engineering Sciences	3	3	2	3
PO2	Problem analysis	1	3	2	2
PO3	Design/development of solutions	1	1	2	1
PO4	Investigation	3	3		3
PO5	Modern Tool Usage				
PO6	Individual and Teamwork	3	3	2	3
PO7	Communication	2		2	2
PO8	Engineer and Society	2		2	2
PO9	Ethics	2		2	2
PO10	Environment and Sustainability	1	1	1	1
PO11	Project Management and Finance	1	1	1	1
PO12	Life Long Learning	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline	3	3	1	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	1	3

PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	1	3

ACIL3106	Water and Waste Water Engineering Lab	L	T	P	C	TOTAL
		0	0	4	2	100

PRE-REQUISITES:
ACIT2108 – Water Supply Engineering
ACIT3112 – Waste Water Engineering

OBJECTIVES:
To analyse the physical, chemical and biological characteristics of water and wastewater and to quantify the dosage requirement for coagulationprocess.

LIST OF EXPERIMENTS:

1. Determination of pH, Turbidity and Hardness.
2. Determination of Ammonia Nitrogen in wastewater.
3. Coagulation and Precipitation process for treating wastewater
4. Determination of suspended, volatile, fixed and settleable solids in wastewater.
5. B.O.D.test
6. C.O.D.test
7. Nitrate in wastewater.
8. Phosphate in wastewater.
9. Determination of Calcium, Potassium andSodium.
10. Heavy metals determination - Chromium, Lead and Zinc. (Demonstrationonly)

COURSE OUTCOMES:
The students completing the course will be able to
CO1 - Calibrate and standardize the equipment
CO2 - Collect proper sample for analysis
CO3 - Know the sample preservation methods
CO4 - Perform field oriented testing of water, wastewater
CO5 - Perform coliform analysis

REFERENCES:
Standards Methods for the Examination of Water and Wastewater, 17th Edition, WPCF, APHA and AWWA, USA, 1989.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
	PROGRAM OUTCOMES(PO)						
PO1	Knowledge of Engineering Sciences	2	2	1	3	2	2
PO2	Problem analysis	1	1	1	3	3	2
PO3	Design / development of solutions	1	1	1	3	3	2
PO4	Investigation	1	1	1	3	3	2
PO5	Modern Tool Usage	2	1	1	3	3	2
PO6	Engineer and Society	1	2	2	2	2	2
PO7	Environment and Sustainability	2	2	2	2	2	2
PO8	Ethics	2	2	2	3	3	3
PO9	Individual and Team work	1	1	2	3	2	2
PO10	Communication	1	1	2	2	2	2
PO11	Project Management and Finance	1	2	2	3	2	2

PO12	Life Long Learning	3	3	2	2	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	1	2	2	3	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	3	2	2
PSO3	Conceptualization and evaluationof Engineering solutions to Civil engineering issues	2	2	2	3	2	2

ACIL3107	**Computer Aided Structural Drawing Lab**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**4**	**2**	**100**

PRE-REQUISITES:

ACIL2106 Computer Aided Building Drawing Lab
ACIT3113 Design of Reinforced Concrete Elements

OBJECTIVES:

- To impart knowledge and skill relevant to Building and Structural detailed drawing using computer software

LIST OF EXPERIMENTS:

1. Reinforcement details of RCC Slab
2. Reinforcement details of RCC Column
3. Reinforcement details of RCC Beam
4. Reinforcement details of RCC Cantilevert Retaining Walls
5. Fabrication Drawing of Steel Truss

COURSE OUTCOMES:

The students completing the course will be able to
CO1- Draw reinforcement details of RCC slab
CO2- Draw reinforcement details of RCC Column
CO3 Draw the structural detailing of RCC Beam
CO4 Draw the structural detailing of RCC Cantilever Retaining Walls
CO5 Draw the structural detailing of Steel Truss

REFERENCES:

Allen Jefferis and Kenneth D.Smith, Commercial Drafting and Detailing, Delmar Cengage Learning, Third Edition

COs- PO's & PSO's MAPPING

PO/PSO		**Course Outcome**					**Overall Correlation of CO s to POs**
		CO1	**CO2**	**CO3**	**CO4**	**CO5**	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	-	2	2	2	2	2
PO3	Design / development of solutions	-	-	-	-	-	-
PO4	Investigation	-	-		2	2	2
PO5	Modern Tool Usage	2	2	2	2	2	2
PO6	Engineer and Society	-	3	3	3	3	3
PO7	Environment and Sustainability	-	-	-	-	-	-
PO8	Ethics	1	2	2	1	2	2
PO9	Individual and Team work	-	3	3	3	3	3
PO10	Communication	-	2	2	2	2	2
PO11	Project Management and Finance	-	-	-	-	-	-

PO12	Life Long Learning	1	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	2	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	-	2	2	2	2	2

SEMESTER 6

ACIT3115	Structural Analysis II	L	T	P	C	TOTAL
		3	1	0	4	100

PRE-REQUISITES:
ACIT 3110 Structural Analysis I

OBJECTIVES:

- The student is expected to learn the method of drawing influence lines and its uses in various applications like beams and planetrusses.
- Also the student should be able to analyse the arches, suspension bridges , spacetrusses.
- He/She should be able to carry out Plastic analysis of beams and rigid frames.

MODULE I INFLUENCE LINES FOR DETERMINATE BEAMS
Influence lines for reactions in statically determinate beams – Influence lines for shear force and bending moment – Calculation of critical stress resultants due to concentrated and distributed moving loads – absolute maximum bending moment - influence lines for member forces in pin jointed plane frames.

MODULE II INFLUENCE LINES FOR INDETERMINATE BEAMS
Muller Breslau's principle– Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one), and fixed beams.

MODULE III ARCHES
Arches - Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects.

MODULE IV CABLES AND SUSPENSION BRIDGES
Equilibrium of cable – length of cable - anchorage of suspension cables – stiffening girders - cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders.

MODULEV PLASTIC ANALYSIS
Plastic theory - Statically indeterminate structures – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – collapse load - Static and kinematic methods – Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.

COURSE OUTCOMES:
Students will be able to
CO1 - Draw influence lines for statically determinate structures and calculate critical stress resultants.
CO2 - Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
CO3 - Analyse of three hinged, two hinged and fixed arches.
CO4 - Analyse the suspension bridges with stiffening girders
CO5 - Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.

TEXTBOOKS:

1. Bhavikatti,S.S, Structural Analysis,Vol.1 & 2, Vikas Publishing HousePvt.Ltd., NewDelhi-4,2014.
2. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, Theory ofstructures, Laxmi,Publications,2004.
3. Vazrani.V.N And Ratwani,M.M, Analysis of Structures, Vol.II,Khanna Publishers,2015.

REFERENCES:

1. Negi.L.S and Jangid R.S., Structural Analysis, Tata McGraw-Hill Publishers, 2004.
2. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2002.
3. Gambhir.M.L., Fundamentals of Structural Mechanics and Analysis, PHIL earning Pvt. Ltd., 2011. 4. Prakash Rao D.S., Structural Analysis, Universities Press,1996.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	1	1	1	1	1
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT3116	Design of Steel Structural Elements	L	T	P	C	TOTAL
		3	1	0	4	100

PRE-REQUISITES:
ACIT1101 Engineering Mechanics
ACIT 2102 Strength of Materials I

OBJECTIVES:

- To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections.
- To provide the students the tools necessary for designing structural systems such as roof trusses and gantry girders as per provisions of current code (IS 800 - 2007) of practice.

MODULE I INTRODUCTION
Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using welding, bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints.

MODULE II TENSION MEMBERS
Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

MODULE III COMPRESSION MEMBERS
Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns –Design of column bases –axial load and biaxial bending moment with shear- Gusseted base

MODULE IV BEAMS
Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices.

MODULE V ROOF TRUSSES AND INDUSTRIAL STRUCTURES
Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.

COURSE OUTCOMES:
At the end of the course, the students will be able to
CO1- Recognize the design philosophy of steel structures and identify the different failure modes of bolted and welded connections, and determine their design strengths
CO2- Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria
CO3- Apply the principles, procedures and current code requirements to the analysis and design of steel tension members, columns, column bases and beams
CO4 - Identify and compute the design loads on Industrial structures, and gantry girder
CO5 - Find out ultimate load of steel beams and portal frames using plastic analysis

TEXT BOOKS:
1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGrawHill Education India Pvt. Ltd.,2013
2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition,2013.
3. Subramanian.N, "Design of Steel Structures", Oxford University Press,New Delhi,2013.

REFERENCES:
1. Narayanan.R.et.al. "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications,2002
2. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGrawHill Publishing Company,2005
3. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800– 2007, IK International

Publishing House Pvt. Ltd.,2009
4. Shah.V.L. and Veena Gore, "Limit State Design of Steel Structures", IS 800– 2007 Structures Publications,2009.
5. IS 800:2007, General Construction In Steel - Code of Practice, (ThirdRevision), Bureau of Indian Standards, New Delhi,2000

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	2	2	3	2	2
PO2	Problem analysis	2	2	2	2	3	2
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation					2	2
PO5	Modern Tool Usage		2	2	2		2
PO6	Engineer and Society				2		2
PO7	Environment and Sustainability	2			2		2
PO8	Ethics				2		2
PO9	Individual and Team work				2		2
PO10	Communication					1	1
PO11	Project Management and Finance		2	2	2		2
PO12	Life Long Learning	2	2	2	3	3	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	2	2	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	2	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues				3	3	3

ACIT3117	Transportation Engineering	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-REQUISITES:
Nil

OBJECTIVES:

- To introduce the students about planning, design, construction and maintenance and design principles of Highways, Railways and Airport

MODULE I HIGHWAY PLANNING AND GEOMETRIC DESIGN

Significance of highway planning – Locations and functions – Factors influencing highway alignment – Classification of highways- Engineering surveys for alignment - Cross section element, width - camber, design - Speed, sight distances - requirements and design of horizontal and vertical alignments. Highway materials - Tests on aggregates, subgrade soil & bituminous materials.

MODULE II HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE

Highway construction materials, properties, testing methods – CBR Test for subgrade - tests on aggregate & bitumen – Construction practice including modern materials and methods, Bituminous and Concrete road construction, Polymer modified bitumen, Recycling, Different materials – Glass, Fiber, Plastic, Geo-Textiles, Geo-Membrane (problem not included) - Quality control measures - Highway drainage — Construction machineries.

MODULE III RAILWAY PLANNING

Significance of Road, Rail, Air and Water transports - Coordination of all modes to achieve sustainability - Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods- - Soil suitability analysis - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings.

MODULE IV RAILWAY CONSTRUCTION AND MAINTENANCE

Earthwork – Stabilization of track on poor soil –- Tunneling Methods, drainage and ventilation–- Calculation of Materials required for track laying - Construction and maintenance of tracks –Modern methods of construction & maintenance - Railway stations and yards and passengeramenities- Urban rail – Infrastructure for Metro, Mono and underground railways.

MODULE V AIRPORT PLANNING AND DESIGN

Air transport characteristics-airport classification-air port planning , components,layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Runway Design, Orientation, Wind Rose Diagram , Runway length , Geometric design of runways, Configuration and Pavement Design Principles , Elements of Taxiway Design

COURSE OUTCOMES

At the end of the course, the students will be able to

CO1 Understand the concepts and standards adopted in Planning and construction of Highways, Railways.
CO2 Apply the knowledge of science and engineering fundamentals in designing the geometrics Highways and Railways.
CO3 Select appropriate methods for construction, evaluation and maintenance of Railway tracks.
CO4 Understand the concepts and elements in Planning and selection of site for Airport.
CO5 Design the Runway length and evaluate the orientation of runways

TEXT BOOKS:

1. Khanna.S. K., Justo.C.E.G and Veeraragavan A. "HighwayEngineering", Nemchand Publishers,2014.
2. Saxena Subhash C and Satyapal Arora, "A Course in RailwayEngineering", Dhanpat Rai and Sons, Delhi,2003
3. Satish Chandra and Agarwal M.M, "Railway Engineering", 2nd Edition,Oxford University Press, New Delhi,2013.
4. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design",Nemchand and Brothers, Roorkee,2012.

REFERENCES:

1. Kadiyali.L.R. "Principles and Practice of Highway Engineering", KhannaTechnical Publications, 8th edition Delhi,2013.
2. Rangwala, "Railway Engineering", Charotar Publishing House,2013.
3. Rangwala, "Airport Engineering", Charotar Publishing House,2013.
4. Mundrey J.S. “A course in Railway Track Engineering”. Tata McGraw Hill,2007.

COs- PO’s & PSO’s MAPPING

PO/PSO		Course Outcome					Over all Correlation of Cos to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAMOUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	2	2	3		2
PO2	Problem analysis		3	3			3
PO3	Design / development of solutions		3	2		3	3

PO4	Investigation	2	2	2			2
PO5	Modern Tool Usage		2	2		2	2
PO6	Engineer and Society	3		3	3		3
PO7	Environment and sustainability	1	2	3			2
PO8	Ethics	3	3	3	3		3
PO9	Individual and Team work		2			2	2
PO10	Communication				1		1
PO11	Project Management and Finance		2	3			3
PO12	Life Long Learning		3	3		2	3
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and Innovation	2	3	3	2	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues				2	3	2

ACIL3108	**Transportation Enigneering Lab**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**4**	**2**	**100**

PRE-REQUISITES:
ACIT3117 Transportation Engineering

OBJECTIVES:

- To learn the principles and procedures of testing of materials used in the construction of Highways

LIST OF EXPERIMENTS

I TEST ON AGGREGATES

a) Sieve Analysis
b) Flakiness and Elongation Test of Aggregates.
c) Specific Gravity of Aggregates.
d) Aggregate Impact Value
e) Los Angeles Abrasion Test
f) Water Absorption of Aggregates

II TEST ON BITUMEN

a) Specific Gravity of Bitumen
b) Penetration Test
c) Viscosity Test
d) Softening Point Test
e) Ductility Test

III BITUMINOUS MIXES – Demonstration classes only.

a) Marshall Stability and Flow Values
b) Determination of Binder Content

COURSE OUTCOMES:

At the end of the course, the students will be able to
CO1 To characterize various pavement materials
CO2 To test the aggregates
CO3 To test bitumen
CO4 To test bituminous mixes

REFERENCES:

1. Highway Materials and Pavement Testing, Nem Chand and Bros., Roorkee, Revised Fifth Edition, 2009
2. Methods for testing tar and bituminous materials, IS 1201–1978 to IS 1220– 1978,

Bureau of Indian Standards
3. Methods of test for aggregates, IS 2386 – 1978, Bureau of Indian Standards
4. Mix Design Methods Asphalt Institute Manual Series No. 2, Sixth Edition, 1997, Lexington, KY, USA.

COs- PO's & PSO's MAPPING

PROGRAMOUTCOMES(PO)PO/PSO		Course Outcome					Over all Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	1	1	1	1	1	1
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	2	2	2	2	2	2
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	1	1	1	1	1	1
PO7	Environment and sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	3	3	3	3	3	3
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	2	2	2	2	2	2

ACIL3109	Communication Lab	L	T	P	C	TOTAL
		0	0	4	2	100

PRE-REQUISITES:
Nil

OBJECTIVES:
The course aims to :

- Enhance the Employability and Career Skills of students

MODULE I
Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills— Grooming as a professional with values—Time Management—General awareness of CurrentAffairs

MODULE II
Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic –answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

MODULE III
Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -– questioning and clarifying –GD strategies- activities to improve GD skills

MODULE IV
Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

MODULE V
Recognizing differences between groups and teams- managing time-managing stress- networking professionally-respecting social protocols-understanding career management-developing a long-term career plan-making career changes

COURSE OUTCOMES:
At the end of the course, learners will be able to:
CO1 - Make effective presentations
CO2 - Participate confidently in Group Discussions.
CO3 - Attend job interviews and be successful in them.
CO4 - Develop adequate Soft Skills required for the workplace

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi,2015
2. Interact English Lab Manual for Undergraduate Students, OrientBalck Swan:Hyderabad,2016.
3. E. Suresh Kumar et al. Communication for Professional Success.Orient
4. Blackswan: Hyderabad, 2015
5. Raman, Meenakshi and Sangeeta Sharma. ProfessionalCommunication. Oxford University Press: Oxford,2014
6. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai,2010

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
2	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
3	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
4	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
5	2	3	3	3	-	3	3	3	2	3	-	3	-	-	-
AVg.	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-

SEMESTER 7

AMBT1101	Principles of Management and Professional Ethics	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-REQUISITES:
Nil

OBJECTIVES:
- To enable the students to study the evolution of Management,
- To study the functions and principles of management and
- To learn the application of the principles in an organization.

MODULE I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS
Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

MODULE II PLANNING
Nature and purpose of planning – planning process – types of planning – COURSE OBJECTIVES – setting – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

MODULE III ORGANISING

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management ,Career planning and management.

MODULE IV DIRECTING

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership –communication – process of communication – barrier in communication – effective communication –communication and IT.

MODULE V CONTROLLING

System and process of controlling – budgetary and non-budgetarycontrol techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

COURSE OUTCOMES:

Upon completion of the course, students will be able to have clear understanding of
CO1 - managerial functions like planning,
CO2 - organizing,
CO3 - staffing,
CO4 - leading & controlling
CO5 - and have same basic knowledge on international aspect of management

TEXTBOOKS:

1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition,PrenticeHall (India)Pvt. Ltd.,2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6thEdition, Pearson Education,2004.

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentalsof Management" 7th Edition, Pearson Education, 2011.
2. Robert Kreitner & Mamata Mohapatra, " Management", Biztantra,2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" TataMcGraw Hill,1998.
4. Tripathy PC & Reddy PN, "Principles of Managemen

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	2	2	2
PO2	Problem analysis	3	2	2	2	2	2
PO3	Design / development of solutions	2	3	2	2	2	2
PO4	Investigation	2	2	2	3	3	2
PO5	Modern Tool Usage	1	1	1	2	1	1
PO6	Engineer and Society	3	2	3	3	2	3
PO7	Environment and Sustainability	3	2	2	2	3	2
PO8	Ethics	3	3	3	3	3	3
PO9	Individual and Team work	3	3	3	3	2	3
PO10	Communication	3	3	2	3	2	3
PO11	Project Management and Finance	3	3	2	2	3	3
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	2	2	3	3	3	3

PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	2	3	3	3	2	3

ACIT4118	Estimation and Quantity Surveying	L	T	P	C	TOTAL
		3	0	0	3	100

PRE-REQUISITES:
ACIT2103 Construction Materials
ACIT2105 Construction Technology
ACIT3113 Design of Reinforced Concrete Elements

OBJECTIVES:

- To impart knowledge in estimation, tender practices, contract procedures, and valuation of Civil Engineering works.

MODULEI ESTIMATE OF BUILDINGS

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof - Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

MODULEII ESTIMATE OF OTHERSTRUCTURES

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall.

MODULE III SPECIFICATION AND TENDERS

Data – Schedule of rates – Analysis of rates – rate of materials per meter cube of concrete -Specifications – sources – Preparation of detailed and general specifications – Tenders – TTT Act – e-tender – Preparation of Tender Notice and Document – Contracts – Types of contracts – Drafting of contract documents – Arbitration and legal requirements.

MODULE IV VALUATION

Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease

MODULE V REPORT PREPARATION

Principles for report preparation – report on estimate of residential building – Culvert –Roads–Water supply and sanitary installations – Tube wells – Openwells.

COURSE OUTCOMES:

CO1-Explain the basic concept of quantity estimation for building, roads, canals and hydraulic structures by manual and software packages.
CO2 - Acquire the knowledge to calculate rate analysis and man-hours required for the common civil works by manual and software packages.
CO3 -Develop the specification for the materials used in construction, online and offline tender procedures and tender document preparation and report preparation.
CO4 - Acquire the knowledge of construction contracts and contract document preparation.
CO5- Identify the valuation for building, land and plant and machineries, calculation of rent, mortgage and lease.
S

TEXT BOOKS:

1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers& Distributors Pvt. Ltd.,2003
2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing(Civil)", S.Chand & Company

Ltd.,2004

REFERENCES:

1. PWD DataBook.
2. Tamilnadu Transparencies in Tender Act,1998
3. Arbitration and Conciliation Act,1996
4. Standard Bid Evaluation Form, Procurement of Goods or Works, The World Bank, April1996.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	2	1	1	2	2
PO3	Design / development of solutions	3	3	2	1	2	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	3	3	1	1	3	3
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	3	3	2	2	2	2
PO8	Ethics	2	2	2	2	2	2
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	3	3	2	2	2	2
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACII3101	Internship	L	T	P	C	TOTAL
		0	0	2	1	100

PRE-REQUISITES:

All Program Core and Elective Courses

OBJECTIVES:

- To train the students in field work so as to have a firsthand knowledge of practical problems in carrying out engineering tasks.
- To develop skills in facing and solving the field problems

STRATEGY:

The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:

At the end of the course the student will be able to understand

CO1- The intricacies of implementation textbook knowledge intopractice

CO2 - The concepts of developments and implementation of new techniques.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome			Overall Correlation of Cos to POs
		CO1	CO2	CO3	
PO1	Knowledge of Engineering Sciences	3	3	2	3
PO2	Problem analysis	1	3	2	2
PO3	Design/development of solutions	1	1	2	1
PO4	Investigation	3	3		3
PO5	Modern Tool Usage				
PO6	Individual and Teamwork	3	3	2	3
PO7	Communication	2		2	2
PO8	Engineer and Society	2		2	2
PO9	Ethics	2		2	2
PO10	Environment and Sustainability	1	1	1	1
PO11	Project Management and Finance	1	1	1	1
PO12	Life Long Learning	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline	3	3	1	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	1	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	1	3

ACIP4109	Project Phase I	L	T	P	C	TOTAL
		0	0	6	3	100

PRE-REQUISITES:
All Program Core and Elective Courses

OBJECTIVES:
To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

SYLLABUS:
The student works on a topic relevant to civil engineering under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

COURSE OUTCOMES:
CO1 Identify civil engineering problems reviewing available literature.
CO2 Identify appropriate techniques to analyze complex civil engineering problems.
CO3 Apply engineering and management principles through efficient handling of project have a clear idea of his/her area of work and they are in a position to carry out the work in a systematic way.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome			Overall Correlation of Cos to POs
		CO1	CO2	CO3	
PO1	Knowledge of Engineering Sciences	3	3	2	3

PO2	Problem analysis	1	3	2	2
PO3	Design/development of solutions	1	1	2	1
PO4	Investigation	3	3		3
PO5	Modern Tool Usage				
PO6	Individual and Teamwork	3	3	2	3
PO7	Communication	2		2	2
PO8	Engineer and Society	2		2	2
PO9	Ethics	2		2	2
PO10	Environment and Sustainability	1	1	1	1
PO11	Project Management and Finance	1	1	1	1
PO12	Life Long Learning	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline	3	3	1	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	1	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	1	3

ACII4104	**Internship**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**2**	**1**	**100**

PRE-REQUISITES:
All Program Core and Elective Courses

OBJECTIVES:

- To train the students in field work so as to have a firsthand knowledge of practical problems in carrying out engineering tasks.
- To develop skills in facing and solving the field problems

STRATEGY:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:
At the end of the course the student will be able to understand
CO1- The intricacies of implementation textbook knowledge intopractice
CO2 - The concepts of developments and implementation of new techniques.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome			Overall Correlation of Cos to POs
		CO1	CO2	CO3	
PO1	Knowledge of Engineering Sciences	3	3	2	3
PO2	Problem analysis	1	3	2	2
PO3	Design/development of solutions	1	1	2	1
PO4	Investigation	3	3		3
PO5	Modern Tool Usage				
PO6	Individual and Teamwork	3	3	2	3
PO7	Communication	2		2	2
PO8	Engineer and Society	2		2	2

PO9	Ethics	2		2	2
PO10	Environment and Sustainability	1	1	1	1
PO11	Project Management and Finance	1	1	1	1
PO12	Life Long Learning	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline	3	3	1	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	1	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	1	3

ACIP4109	**Project Phase II**	**L**	**T**	**P**	**C**	**TOTAL**
		0	**0**	**14**	**7**	**100**

PRE-REQUISITES:
All Program Core and Elective Courses

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

SYLLABUS:
The student works on a topic relevant to civil engineering under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

COURSE OUTCOMES:
CO1 Identify civil engineering problems reviewing available literature.
CO2 Identify appropriate techniques to analyze complex civil engineering problems.
CO3 Apply engineering and management principles through efficient handling of project have a clear idea of his/her area of work and they are in a position to carry out the work in a systematic way.

COs- PO's & PSO's MAPPING

PO/PSO		**Course Outcome**			**Overall Correlation of Cos to POs**
		CO1	**CO2**	**CO3**	
PO1	Knowledge of Engineering Sciences	3	3	2	3
PO2	Problem analysis	1	3	2	2
PO3	Design/development of solutions	1	1	2	1
PO4	Investigation	3	3		3
PO5	Modern Tool Usage				
PO6	Individual and Teamwork	3	3	2	3
PO7	Communication	2		2	2
PO8	Engineer and Society	2		2	2
PO9	Ethics	2		2	2
PO10	Environment and Sustainability	1	1	1	1

PO11	Project Management and Finance	1	1	1	1
PO12	Life Long Learning	3	3	3	3
PSO1	Knowledge of Civil Engineering discipline	3	3	1	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	1	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	1	3

PROGRAMME ELECTIVES

GROUP A STRUCTURAL ENGINEERING

ACIT3118	Advanced Reinforced Concrete Structures	L	T	P	C	TOTAL
		3	1	0	4	100

PRE-REQUISITES:
ACIT2102 Strength of Materials I
ACIT 3113 Design of Reinforced Concrete Elements

COURSE OBJECTIVES:

- To give an exposure to the design of continuous beams, slabs, staircases, walls and brick masonry structures and to introduce yield line theory

MODULE I RETAINING WALLS
Design of Cantilever and Counter fort Retaining walls

MODULE II WATER TANKS
Design of rectangular and circular water tanks both below and above ground level - Design of circular slab.

MODULE III DESIGN OF FLAT SLABS
Design of flat slabs –Direct design Method- Equivalent Frame method

MODULE IV YIELD LINE THEORY
Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment - Application of virtual work method - square, rectangular, circular and triangular slabs - Design problems.

MODULEV SPECIAL TOPICS
Design of staircases (ordinary and doglegged)- Principles of design of mat foundation, box culvert and road bridges

COURSE OUTCOMES:
CO1 - Students will be able to analyze and design various Earth and Water retaining structures.
CO2 - Students will be able to analyze and design of flat slabs.
CO3 - Students will be able to analyze and design stair cases, flat slab and mat foundation.
CO4 - Students will be able to understand yield line theory and apply it for simple design of slabs.
CO5 - Principles of design of mat foundation, box culvert and road bridges

TEXT BOOKS:

1. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hallof IndiaPrivate,

Limited,2012.
2. Dayaratnam, P., “Brick and Reinforced Brick Structures”, Oxford & IBH Publishing, House,1997
3. Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. DesignsReinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi,2006.
4. Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hallof India Pvt. Ltd., New Delhi,2012.

REFERENCES:

1. Mallick, D.K. and Gupta A.P., “Reinforced Concrete”, Oxford and IBH Publishing Company,1997
2. Syal, I.C. and Goel, A.K., “Reinforced Concrete Structures”, A.H. Wheelers& Co. Pvt. Ltd.,1998
3. Ram Chandra.N. and Virendra Gehlot, “Limit State Design”, StandardBook House,2004.
4. Subramanian. N., "Design of Reinforced Concrete Structures",Oxford University, New Delhi,2013.
5. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi,2007
6. IS1905:1987, Code of Practice for Structural use of UnreinforcedMasonry Bureau of Indian Standards, New Delhi,2002

COs- PO’s & PSO’s MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT3119	**Structural Dynamics And Earthquake Engineering**	**L**	**T**	**P**	**C**	**TOTAL**
		3	**1**	**0**	**4**	**100**

PRE-REQUISITES:

ACIT1101 Enigneering Mechanics
ACIT3110 Structural Analysis I
ACIT3115 Structural Analysis II

COURSE OBJECTIVES:

- The main objective of the course is to introduce dynamic loading and the dynamic performance of the structures to the students.
- Different types of dynamic loading also to be discussed.

- The detailed study on the performance of structures under earthquake loading is also one of the focus of the course.

MODULE I THEORY OF VIBRATIONS

Difference between static loading and dynamic loading – Degree of freedom – idealisation of structure as single degree of freedom system – Formulation of Equations of motion of SDOF system - D‟Alemberts principles – effect of damping – free and forced vibration of damped and undamped structures – Response to harmonic and periodic forces.

MODULE II MULTIPLE DEGREE OF FREEDOM SYSTEM

Two degree of freedom system – modes of vibrations – formulation of equations of motion of multi degree of freedom (MDOF) system - Eigen values and Eigen vectors
– Response to free and forced vibrations - damped and undamped MDOF system – Modal superposition methods.

MODULE III ELEMENTS OF SEISMOLOGY

Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Estimation of earthquake parameters - Magnitude and intensity of earthquakes – Spectral Acceleration.

MODULE IV RESPONSE OF STRUCTURES TO EARTHQUAKE

Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading – Pinching effect– Bouchinger Effects – Evaluation of earthquake forces as per IS:1893 – 2002 – Response Spectra – Shock Response Spectra method- Lessons learnt from pastearthquakes.

MODULE V DESIGN METHODOLOGY

Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 1993 –Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Later loadanalysis
– Design and detailing as per IS:13920 – 1993.

COURSE OUTCOMES:

At the end of the course, student will have the knowledge about earthquake loading and phenomena.
CO1 –Students will develop knowledge in the simulation and mathematical model development.
CO2 – Students will be trained to identify, formulate and solve complicated problems.
CO3 – Students will be able to understand the role of natural calamity in the damage of structures.
CO4 – Students will be able to develop the skill to analyse data and to apply the same in the practical problems.
CO5 – Students will be able to apply the developed methodologies for the safe and stable design of structures.

TEXT BOOKS:

1. Chopra, A.K., “Dynamics of Structures – Theory and Applications to Earthquake Engineering”, 4th Edition, Pearson Education,2011.
2. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd.2007.

REFERENCES:

1. Biggs, J.M., “Introduction to Structural Dynamics”, McGraw Hill Book Co., New York,1964
2. Dowrick, D.J., “Earthquake Resistant Design”, John Wiley & Sons, London, 2009

Paz, M. and Leigh.W. “Structural Dynamics – Theory & Computation”, 4th Edition, CBS Publishers & Distributors, Shahdara, Delhi,2006.

COs- PO’s & PSO’s MAPPING

PO/PSO	Course Outcome	Overall

		CO1	CO2	CO3	CO4	CO5	Correlation of CO s to POs
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	2	3	3	3	3
PO3	Design / development of solutions	3	2	3	3	3	3
PO4	Investigation	2	2	3	2	3	2
PO5	Modern Tool Usage	1	1	1	2	2	2
PO8	Engineer and Society	1	1	3	2	3	2
PO10	Environment and Sustainability	1	1	2	3	3	2
PO9	Ethics	1	1	1	1	1	1
PO6	Individual and Team work	1	1	1	1	1	1
PO7	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	3	3	2
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	2	3	3	3	3

ACIT4119	**Prestressed Concrete Structres**	**L**	**T**	**P**	**C**	**TOTAL**
		3	**1**	**0**	**4**	**100**

PRE-REQUISITES:

ACIT3110 Structural Analaysis I
ACIT 3113 Design of Reinforced Concrete Elements
ACIT3115 Structural Analaysis II

COURSE OBJECTIVES:

The objective of this course is

- To explain the methods, types and advantages of prestressing and
- To design prestressed concrete structural elements and systems

MODULE I INTRODUCTION – THEORY AND BEHAVIOUR

Basic concepts – Advantages – Materials required – Systems and methods of prestressing – pretensioning – post tensioning- Analysis of sections – Concentric and Eccentric Tendons - Stress concept – Strength concept – Load balancing concept – Factors influencing deflections – Calculation ofdeflections

MODULE II LOSSES AND ANCHORAGE ZONE STRESSES

Losses of prestress - Determination of anchorage zone stresses in post-tensioned beams by Magnel‟s method, Guyon‟s method and IS1343 code – design of anchorage zone reinforcement

MODULE III DESIGN FOR FLEXURE AND SHEAR

Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post- tensioned and pre- tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre- tensioned beams – Design for shear based on 1343 Code.

MODULE IV CIRCULAR PRESTRESSING

Prestressed concrete water tanks - pipes

MODULE V - DESIGN OF PRESTRESSED CONCRETE SLAB

Types of prestressed concrete slab - design of one-way slab - design of two-way slab

COURSE OUTCOMES:

Students will be able to

CO1 - To understand the concept of prestressing and calculation of stresses

CO2 - To analyse for deflection of prestressed concrete members and design the anchorage zone.

CO3 - To design prestressed concrete beams in flexure and shear as per Indian standard code

CO4 - To design prestressed concrete water tanks and pipes

CO5 - To design prestressed concrete slabs

TEXT BOOKS:

1. Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw HillCompany, New Delhi,2012
2. Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House,2002.

REFERENCES:

1. Pandit.G.S. and Gupta.S.P., "Prestressed Concrete", CBS Publishersand Distributers Pvt. Ltd,2012.
2. Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH,2013
3. Lin T.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi,2013.

IS1343: 2012, Code of Practice for Prestressed Concrete, Bureau ofIndian Standards, New Delhi,2012

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	2	2	3
PO2	Problem analysis	3	2	2	2	2	2
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	1	1	1	1	1	1
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Individual and Team work	1	1	1	1	1	1
PO7	Communication	1	1	1	1	1	1
PO8	Engineer and Society	2	2	2	2	2	2
PO9	Ethics	1	1	1	1	1	1
PO10	Environment and Sustainability	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	1	3	3	2	3	1
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	1	2	2	2	2	2

ACIT4120	**Design of RC and Steel Storage Structures**	**L**	**T**	**P**	**C**	**TOTAL**
		3	**1**	**0**	**4**	**100**

PRE-REQUISITES:

ACIT 3113 Design of Reinforced Concrete Elements

ACIT3116 Design of Steel Structural Elements

COURSE OBJECTIVE

The main objective of this course is

- To impart the principles involved in designing structures which have to store different types of materials.

MODULE I STEEL WATER TANKS

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank– side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

MODULE II CONCRETE WATER TANKS

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome –Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

MODULE III STEEL BUNKERS AND SILOS

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates –Ring girder – stiffeners.

MODULE IV CONCRETE BUNKERS AND SILOS

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams –Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction

MODULE V PRESTRESSED CONCRETE WATER TANKS

Principles of circular pre-stressing – Design of pre-stressed concrete circular water tanks.

COURSE OUTCOMES:

Students will be able to

CO1 - Design structures which have to store different types of materials.
CO2 - Design concrete and steel material retaining structures.
CO3 - Design steel bunkers and silos
CO4 - Design Concrete bunkers and silos
CO5 - Design prestressed water tanks.

TEXT BOOKS

Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3

PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT4121	Tall Buildings	L	T	P	C	TOTAL
		3	1	0	4	100

PRE-REQUISITES:
ACIT3110 Structural Analaysis I
ACIT 3113 Design of Reinforced Concrete Elements
ACIT3115 Structural Analaysis II

COURSE OBJECTIVE

- The design aspects and analysis methodologies of tall buildings will be introduced.
- The stability analysis of tall buildings

MODULE I DESIGN CRITERIA AND MATERIALS
Development of High Rise Structures - General Planning Considerations - Design philosophies -Materials used for Construction - High Strength Concrete - High Performance Concrete – Self Compacting Concrete - Glass - High Strength Steel

MODULE II LOADING
Gravity Loading - Dead Load - Live Load - Live load reduction technique - Impact Load -Construction Load - Sequential Loading. Lateral Loading - Wind load - Earthquake Load-Combination of Loads.

MODULE III BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS
Factors affecting growth, Height and Structural form. High rise behaviour of Various structural systems - Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wallframes, tubular structures, cores, outrigger - braced and hybrid mega systems.

MODULE IV ANALYSIS AND DESIGN
Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerised general three dimensionalanalysis.

MODULE V STABILITY OF TALL BUILDINGS
Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P- Delta analysis, Translational, Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundationrotation.

COURSE OUTCOMES:
At the end of this course the student should have
CO1 - an understanding on the behaviour of tall buildings subjected to lateral building.
CO2 - The students should have knowledge about the rudimentary principles of designing tall buildings as per the existing codes.
CO3 - Knowledge about the behavior of various structural systems.
CO4 - Students are exposed to different methods of analysis and design of tall buildings.
CO5 - Students will possess knowledge about stability of tall buildings.

At the end of this course the student should have an understanding on the behaviour of tall buildings subjected to lateral building. The students should have knowledge about the rudimentary principles of designing tall buildings as per the existing codes.

TEXT BOOKS:

1. Bryan Stafford Smith, Alex coull, “Tall Building Structures, Analysis and Design”, John Wiley and Sons, Inc.,1991.
2. Taranath B.S., “Structural Analysis and Design of Tall Buildings”, McGraw Hill,2011.

REFERENCES:

1. Lin.T.Y, Stotes Burry.D, “Structural Concepts and systems for Architectsand
2. Engineers”, John Wiley,1988.
3. Lynn S.Beedle, “Advances in Tall Buildings”, CBS Publishers and Distributors, Delhi,1986.

Wolfgang Schueller "High Rise Building Structures", John Wiley and Sons, New York,1977.

COs- PO’s & PSO’s MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	1	2	2	1	2
PO2	Problem analysis	2	-	3	3	3	3
PO3	Design / development of solutions	1	-	3	3	3	3
PO4	Investigation	3	2	2	3	3	3
PO5	Modern Tool Usage	3	2	3	2	2	2
PO6	Engineer and Society	2	2	3	1	2	2
PO7	Environment and Sustainability	2	3	2	2	1	2
PO8	Ethics	-	-	1	1	1	1
PO9	Individual and Team work	1	1	2	1	2	1
PO10	Communication	1	1	2	1	2	1
PO11	Project Management and Finance	2	2	3	2	3	2
PO12	Life Long Learning	1	1	2	1	2	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	3	3	2	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	2	3	3	2	3

ACIT4122	**Precast Concrete Structures**	**L**	**T**	**P**	**C**	**TOTAL**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:

ACIT 3113 Design of Reinforced Concrete Elements

COURSE OBJECTIVE

The objective of this course is

- To make aware of the precast concrete systems, design procedures, production and construction methods.

MODULE – I INTRODUCTION

Definition – advantages and limitations - Modular co-ordination – Standardization - Tolerances- Production techniques

MODULE – I PRECAST CONCRETE SYSTEMS

Waffle shell system - Precast RCC joists and Filler Blocks System – Precast reinforced or prestressed concrete channel Modules – Plate floor system - Precast prestressed slab elements - Precast hollow core slabs – Precast concrete double tees – Large panel prefabrication – Tilt-up system – Lift slab system – Box Modules – Precast frame systems – Precast ferrocement Modules.

MODULE – III JOINTS AND CONNECTIONS

Types of joints – based on action of forces - compression joints, shear joints and tension joints – based on function – construction, contraction, expansion – design of expansion joints – Types of sealants – types of structural connections - Column to base connections – Column to column connections – Beam to column connections – Beam to beam connections

MODULE – IV CONSTRUCTION TECHNIQUES

Storage of precast Modules – handling of precast Modules – Transport of precast Modules – Cranes and handling equipment – lifting clamps and lifting devices - Erection preparation - Erection safety - Erection sequence- Temporary fixing and bracing of wall Modules after erection – Scaffolding – Erection and assembly of wall Modules and floor Modules – Sequencing of building operations – Safety precautions.

MODULE V DESIGN FOR ABNORMAL LOADS

Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes - Importance of avoidance of progressive collapse.

COURSE OUTCOMES

The students will be able to

CO1 – Understand principles of precast construction.
CO2 - Acquire knowledge about panel systems, slabs, connections used in precast construction and they will be in a position to design the elements.
CO3 - Acquire knowledge about types of floor systems, stairs and roofs used in precast construction.
CO4 – Aquire knowledge about types of walls used in precast construction, sealents, design of joints.
CO5 – Aquire knowledge about components in industrial buildings.

TEXTBOOKS

1.Bachmann, H. and Steinle, A.,"Precast Concrete Structures", Ernst and Sohn, Berlin,2011.
2. BRuggeling A.S.G. and Huyghe G.F.,"Prefabrication with Concrete", A.A.Balkema Publishers
3.Design and construction of precast concrete structures, Dr.D.S.Ramachandra Murthy , DipthiPress
4.Lewitt, M., "Precast Concrete – Materials, Manufacture, Properties and Usage", Applied Science Publishers,London and New Jersey,1982.
5.Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag,1978.

REFERENCES

1.Koncz T., Manual of precast concrete construction, Vol. 1 & 2, Bauverlag GmbH, Wiesbaden and Berlin,1971.
2.National Building Code of India 2005, Part 6 Structural Design, Section 7 – Prefabrication, Systems Building and Mixed Composite Construction, Bureau of Indian Standards, NewDelhi.
3.PCI Manual for the design of hollow core slabs, Precast/Prestressed concrete Institute, Chicago, U.S.A.,1998.
4.Joseph J.Waddell, Precast concrete: Handling and Erection, Jointly published by The Iowa State University Press, AMES, Iowa and American Concrete Institute, 1974.

COs- PO's & PSO's MAPPING

PO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	1	3	2	2	2
PO3	Design / development of solutions	3	2	3	2	3	3

PO4	Investigation	3	1	3	2	3	2
PO5	Modern Tool Usage	3	1	3	1	1	2
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	3	3	3	3	3	3
PO9	Individual and Team work	3	1	2	1	1	2
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil engineering discipline	3	3	3	3	3	3
PSO2	Civil Engineering Performance Evaluation and coordination	2	2	2	2	2	2
PSO3	Conceptualization of Civil Engineering Systems	2	2	2	2	2	2

ACIT4123	**Repair and Rehabilitation of Structures**	**L**	**T**	**P**	**C**	**TOTAL**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT2103 Construction Materials

COURSE OBJECTIVE

- To make the students to gain the knowledge on quality of concrete, durability aspects,causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

MODULE I MAINTENANCE AND REPAIR STRATEGIES

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes ofdeterioration.

MODULE II STRENGTH AND DURABILITY OF CONCRETE

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.

MODULE III SPECIAL CONCRETES

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

MODULE IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

MODULE V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition Techniques - Engineered demolition methods – Case studies.

COURSE OUTCOMES:

Students will be able to understand
CO1:the importance of maintenance and assessment method of distressed structures.
CO2: the strength and durability properties, their effects due to climate and temperature.
CO3: recent development in concrete
CO4: the techniques for repair and protection methods

CO5: repair, rehabilitation and retrofitting of structures and demolition methods.

TEXT BOOKS:

1.Denison Campbell, Allen and Harold Roper, "Concrete Structures,Materials, Maintenance and Repair", Longman Scientific and Technical UK,1991.
2.Allen R.T. & Edwards S.C, Repair of Concrete Structures, Blakie and Sons, UK, 1987.

REFERENCES:

1.Shetty M.S., "Concrete Technology - Theory and Practice", S.Chand and Company,2008.
2.Dov Kominetzky.M.S., "Design and Construction Failures", Galgotia Publications Pvt.Ltd.,2001.
3.Ravishankar.K., Krishnamoorthy.T.S, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers,2004.
4.CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers,2008.
5.Gambhir.M.L., "Concrete Technology", McGraw Hill,2013.`

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	2	2	3
PO2	Problem analysis	2	2	2	2	2	2
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	-	-	-	-	-	-
PO5	Modern Tool Usage	-	-	-	-	-	-
PO6	Engineer and Society	-	-	-	-	-	-
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	2	1	1	1	1	1
PO10	Communication	-	-	-	-	-	-
PO11	Project Management and Finance	-	-	-	-	-	-
PO12	Life Long Learning	1	1	1	1	1	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	-	1	1	-	-	1
PSO2	Critical analysis of Civil Engineering problems and innovation	-	1	-	1	2	1
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	-	1	2	-	2	2

GROUP B WATER RESOURCES ENGINEERING

ACIT 3121	**Remote Sensing & GIS**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT2107 - Surveying

COURSE OBJECTIVES:

- To introduce the students to the basic concepts and principles of various components of remote sensing.
- To provide an exposure to GIS and its practical applications in civil engineering.

MODULE I - EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein‟s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

MODULE II PLATFORMS AND SENSORS
Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

MODULE III IMAGE INTERPRETATION AND ANALYSIS
Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre- processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

MODULE IV GEOGRAPHIC INFORMATION SYSTEM
Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares
– Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

MODULE V DATA ENTRY, STORAGE AND ANALYSIS
Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

COURSE OUTCOMES:
At the end of this course students were able to
CO1 - Identify the Principles of Remote Sensing
CO2 - Analysis of RS and interpreting the data for modeling applications
CO3 – Apply the image interpretation in various fields
CO4 – Choose the services and applications of GIS and DBMS in industry.
CO5 – Design data models and create data inputs.

TEXT BOOKS:
1. Lillesand,T.M., Kiefer, R.W. and J.W.Chipman. "Remote Sensing and Image Interpretation" 5th Edition., John Willey and Sons Asia Pvt. Ltd., New Delhi, 2004.
2. Anji Reddy, M. "Textbook of Remote Sensing and Geographical Information System" 2nd edition. BS Publications, Hyderabad, 2001.

REFERENCES:
1. Lo. C.P.and A.K.W.Yeung, "Concepts and Techniques of Geographic Information Systems",Prentice Hall of India Pvt. Ltd., New Delhi, 2002
2. Peter A.Burrough, Rachael A. McDonnell, " Principles of GIS", Oxford University Press, 2000
3. Ian Heywood "An Introduction to GIS", Pearson Education Asia, 2000

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAMOUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	2	2	2	2
PO2	Problem analysis				3	3	3

PO3	Design / development of solutions				2	2	2
PO4	Investigations				3	3	3
PO5	Use of Modern Technology				3	3	3
PO6	Engineer and Society					3	3
PO7	Environment and Sustainability				3	3	3
PO8	Ethics				3		3
PO9	Individual and Team work			3		3	3
PO10	Communication			3		3	3
PO11	Project Management and Finance				1	1	1
PO12	Life Long Learning				2	2	2
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Geoinformatics discipline	3	3	3	3	3	3
PSO2	Critical analysis of Geoinformatics Engineering problems and innovations				3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Geoinformatics engineering issues.	2	2	3	3	3	3

ACIT 3120	**Total Station and GPS**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT2107 - Surveying

OBJECTIVE :

- To understand the working of Total Station equipment and solve the surveying problems.

MODULE I - FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.

MODULE II - ELECTRO-OPTICAL AND MICROWAVE SYSTEM

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments – Traversing and Trilateration-COGO functions, offsets and stake out-land survey applications.

MODULE III - SATELLITE SYSTEM

Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler‘s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept –GNSS, IRNSS and GAGAN - Different segments - space, control and user segments - satellite configuration – GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

MODULE IV - GPS DATA PROCESSING

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data RINEX Format – Differential data processing –

software modules -solutions of cycle slips, ambiguities, Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

MODULE V - HYDROGRAPHIC, MINE AND CADASTRAL SURVEYING

Reconnaissance – Route surveys for highways, railways and waterways – Hydrographic survey- Tides – MSL – Sounding methods – Three point problem – River surveys – Measurement of current and discharge – Mine surveying Equipment – Weisbach triangle – Tunnel alignment and setting out – Transfer of azimuth – Gyro Theodolite – Shafts and audits - Cadastral survey- Legal – Real – Taxcadastre – Land record system – Settlement procedure – deformation studies.

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1 - understand Working principles of total station and GPS instruments
CO2 - Propagation of EMR through atmosphere and corrections for its effects
CO3 - The functioning various types total station and GPS equipments and their applications
CO4 - Various techniques available for surveying and mapping with total station and GPS.
CO5 - Able to understand the hydrographic, mine and cadastral surveying

TEXTBOOKS:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1996
2. Satheesh Gopi, rasathishkumar, N.madhu, ― Advanced Surveying , Total Station GPS and Remote Sensing ― Pearson education , 2007 isbn: 978-81317 00679

REFERENCES :

1. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.
3. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.
4. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
5. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

COs- PO's & PSO's MAPPING

PO	Graduate Attribute	Course Outcome					Average
		CO1	CO2	CO3	CO4	CO5	
PO1	Engineering Knowledge	3	3	3	3	3	3
PO2	Problem Analysis	2	2	2	2	3	2
PO3	Design/Development of Solutions	2	3	2	3	3	3
PO4	Conduct Investigations of Complex Problems	2	2	2	3	3	2
PO5	Modern Tool Usage	3	3	3	3	3	3
PO6	The Engineer and Society	2	3	2	3	3	3
PO 7	Environment and Sustainability						
PO 8	Ethics						
PO9	Individual and Team Work	1	1	1	1	2	1
PO10	Communication						
PO11	Project Management and Finance						
PO12	Life-long Learning	2	2	2	2	2	2
PSO1	Knowledge of Geoinformatics discipline	3	3	3	3	3	3
PSO2	Critical analysis of Geoinformatics Engineering problems and innovations	3	3	3	3	3	3

PSO3	Conceptualization and evaluation of Design solutions	3	3	3	3	3	3

ACIT 4124	Hydrology	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:

- To impart knowledge on hydrological cycle, spatial and temporal measurement and
- Analysis of rainfall and their applications including flood routing and ground water hydrology.

MODULE I - PRECIPITATION
Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

MODULE II - ABSTRACTION FROM PRECIPITATION
Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

MODULE III - HYDROGRAPHS
Factors affecting Hydrograph – Baseflow separation – unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – unit hydrograph of different deviations - Synthetic unit Hydrograph

MODULE IV - FLOODS AND FLOOD ROUTING
Flood frequency studies – Recurrence interval – Gumbel‟s method – Flood routing – Reservoir flood routing – Muskingum‟s Channel Routing – Flood control

MODULE V - GROUND WATER HYDROLOGY
Types of aquifers – Darcy‟s law – Dupuit‟s assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

COURSE OUTCOMES:
At the end of the course the student will be able to
CO1 - identify hydrologic cycle, hydrometeorology and formation of precipitation.
CO2 - apply the various methods of field measurements
CO3 – calculate empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
CO4 - understand the basics of groundwater and hydraulics of subsurface flows.
CO5 – compare between the various aquifiers and their applications

TEXT BOOKS:
1. Subramanya, K., “Engineering Hydrology”, Tata McGraw Hill Publishing Co., Ltd., 2000
2. Raghunath, H.M., “Hydrology”, Wiley Eastern Ltd., 2000
3. Jayarami Reddy .P. Hydrology, Tata McGraw Hill, 2008.
4. Madan Mohan das and Mimi Das Saikia, Hydrology, Prentice Hall of India, 2013.

REFERENCES:
1. Chow, V.T. and Maidment D.R. , “Hydrology for Engineers”, McGraw-Hill Inc., Ltd., 2000
2. Singh, V.P., “Hydrology”, McGraw Hill Inc., Ltd., 2000.

COs- PO's & PSO's MAPPING

PO/PSO		COURSE OUTCOMES:					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2	2	2	2	2	2
PO2	Problem analysis	2	3	2	2	2	2
PO3	Design/development of solutions	-	2	2	1	2	1
PO4	Investigation	2	2	1	1	2	2
PO5	Modern Tool Usage	1	1	-	1	1	1
PO6	Engineer and Society	2	2	2	3	3	2
PO7	Environment and Sustainability	2	2	2	2	2	2
PO8	Ethics	-	-	-	2	2	1
PO9	Individual and Team work	2	3	2	2	3	2
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	-	-	2	-	2	1
PO12	Life Long Learning	2	2	2	3	3	2
PSO1	To bring expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	2	2	2	2	2	2
PSO2	To enhance the ability of studentsto formulate solutions to real- world problems pertaining to sustained agricultural productivity using modern technologies.	2	2	2	2	2	2
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	2	3	2	3	3	3

ACIT 4125	Ground Water Engineering	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:

NIL

COURSE OBJECTIVES

At the end of the course, student will be able

- To understand the sources of ground water, aquifers, water occurrence in different types of rocks and
- To study the ground water contamination and recharge methods.

MODULE I – GEOHYDROLOGY

Introduction, Water bearing formations-Aquifer, Aquitard, aquiclude, Aquifuge, Geological formation of water supply, Subsurface distribution of water, Sources of ground water-Types of aquifers-Confined , Unconfined, Leaky and Perched Aquifers, Aquifer parametersPorosity, Hydraulic Conductivity, Specific Yield, Storage Coefficient and Transmissivity, Groundwater in different rocks.

MODULE II – GROUNDWATER MOVEMENT

Groundwater flow-Darcy's law- PermeabilityGround water flow problems i) Steady state 1D flow, ii) Aquifer with recharge, iii) Steady state flow confined aquifer with constant and Variable thickness-Steady state flow-Dupit's Equation and Thiem's Equation-Unsteady flow- Theis method and Jacob's method

MODULE III – WELLS AND EXPLORATION

Open wells-Types, Construction of open wells, Pumping Test, Recuperation Test, Image well Theory-Tube well-Types-Construction and boring of tube well-Well capacity, Well development

MODULE IV – GROUND WATER GEOPHYSICS
Groundwater investigation, Geological methods, Geophysical- Electrical Resistivity Methods, Seismic Refraction methods, Hydrological Maps, Remote sensing methods

MODULE V – ENVIRONMENTAL GROUNDWATER
Groundwater quality- Groundwater contamination-Seawater intrusion-Fresh Water Salt Water Interface, Slope of Interface shape of Interface, Control measures-Groundwater Development, Conjunctive Use, Groundwater recharge, Recharge methods- Groundwater modeling-Conceptual Model, Physical Model, Analog Model, Mathematical Model

COURSE OUTCOMES

At the end of the course the student will be able to

CO1 - understand the sources of ground water, aquifers, water occurrence in different types of rocks.
CO2 - identify the ground water potential theory and movement of ground water through Theis' method and Jacob's method.
CO3 - categorize about open well and tube well.
CO4 - evaluate aquifer parameters through pumping test, recuperation test and methods of ground water investigation.
CO5 – discover the source of ground water contamination and recharge methods

TEXT BOOKS

1.Raghunath .H.M, "Ground Water Hydrology", Wiley Eastern Ltd., Second reprint, 2000

REFERENCE BOOKS

1. David Keith Todd, Larry W.Mays, "Groundwater Hydrology", John Wiley and Sons, 2004.
2. Murthy .V.V.N, "Land and Water Management Engineering", Kalyani Publishers, New Delhi, 1994.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	2	2	2	2
PO2	Problem analysis	3	3	2	2	2	2
PO3	Design / developmentof solutions	3	3	3	2	2	3
PO4	Investigation	-	-	-	-	3	3
PO5	Modern Tool Usage	1	2	3	3	3	3
PO6	Engineer and Society	3	3	2	3	3	3
PO7	Environment and Sustainability	-	-	3	3	3	3
PO8	Ethics	-	-	-	-	3	3
PO9	Individual and Team work	1	2	2	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	2	3	2	2	2
PO12	Life Long Learning	2	2	2	3	3	2
PSO1	Knowledge of Civil Engineering Discipline	2	2	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering issues	2	2	3	3	3	3

ACIT 4126	Ground Improvement Techniques	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
ACIT2109 Soil Mechanics

COURSE OBJECTIVES:

- At the end of the course student is expected to identify the problematic soil and suitable suggest remedial measures to improve their behaviour

MODULE I - PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES
Role of ground improvement in foundation engineering – methods of ground improvement –Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

MODULE II - DEWATEREING
Dewatering Techniques - Well points – Vacuum and electro osmotic methods – Seepage analysis for two – dimensional flow for fully and partially penetrated slots in homogeneous deposits - Simple cases - Design**.**

MODULE III - INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS
Insitu densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibro flotation, Sand compaction piles and deep compaction. Consolidation: Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques – simple design - relative merits of above methods and their limitations**.**

MODULE IV - EARTH REINFORCEMENT
Concept of reinforcement – Types of reinforcement material – Reinforced earth wall
–Mechanism – simple design - applications of reinforced earth. Role of Geotextiles in filtration, drainage, separation, road works and containment.

MODULE V - GROUT TECHNIQUES
Types of grouts – Grouting equipments and machinery – injection methods – Grout monitoring– stabilization with cement, lime and chemicals – stabilization of expansive soil.

COURSE OUTCOMES:
At the end of the course the student will be able to
CO1 - identify and evaluate the deficiencies if any in the deposits of a project area
CO2 - recognize alternate methods to improve its character suitable to the project so that the structures built will be stable and serve**.**
CO3 – organize In-situ treatment of cohesionless and cohesive soil
CO4 – memorize about the grout techniques
CO5 - judge the concept of reinforcement

TEXT BOOKS:

1. Purushothama Raj. P, "Ground Improvement Techniques", Firewall Media, 2005.
2. Koerner, R.M. "Construction and Geotechnical Methods in Foundation Engineering", McGraw Hill, 1994.
3. Mittal.S, "An Introduction to Ground Improvement Engineering", Medtech Publisher,2013**.**

REFERENCES:

1. Moseley, M.P., "Ground Improvement Blockie Academic and Professional", Chapman and Hall, Glasgow, 1998.
2. Jones J.E.P. "Earth Reinforcement and Soil Structure", Butterworths, London, 1985.
3. Winterkorn, H.F. and Fang, H.Y. "Foundation Engineering Hand Book". Van Nostrand Reinhold, 1994.
4. Das, B.M. – "Principles of Foundation Engineering" 7th edition, Cengage learning, 2010.
5. Coduto, D.P. "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd.

New Delhi, 2011.
6. Koerner, R.M. "Designing with Geosynthetics" 4th Edition,Prentice Hall, Jersey, 1999.
7. IS9759 : 1981 "Guidelines for Dewatering During Construction",Bureau of Indian Standards, New Delhi, Reaffirmed 1999

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	2	2	2	2	2
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	2	3	3	3	2	3
PO4	Investigation	3	2	2	1	2	2
PO5	Modern Tool Usage	1	3	3	3	1	3
PO6	Engineer and Society	3	2	3	2	2	3
PO7	Environment and Sustainability	3	2	2	2	2	2
PO8	Ethics	3	1	1	1	1	1
PO9	Individual and Team work	3	2	2	2	2	2
PO10	Communication	3	2	1	1	1	1
PO11	Project Management and Finance	2	1	1	1	1	1
PO12	Life Long Learning	3	3	3	3	3	3
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Geotechnical Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Geotechnical Engineering problems and Innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluationof engineering solutions to geotechnical engineering issues	2	3	3	3	3	3

ACIT 4127	**Design of Hydraulic Structures**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT2104 Fluid Mechanics and Machinery
ACIT2109 Soil Mechanics

COURSE OBJECTIVES:

- To demonstrate and understand the advanced fluid mechanics principles and Implement the geotechnical engineering principles.
- To get a knowledge of various types of hydraulic structures & to design the different elements of hydraulic structures.

MODULE 1 - RESERVOIR PLANNING & EARTH DAMS

Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir. Types, causes of failure and design criteria, soils suitabllity for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

MODULE 2 - GRAVITY DAMS

Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, practical profile, evaluation of profile by method of zoning, foundation treatment, construction joints, galleries in gravity dams.

MODULE 3- SPILLWAYS & ENERGY DISSIPATORS

Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.design of outlets and rating curves Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles. Design of canal regulating structures, Design of Channel transitions,Design of Sarda type Falls, Design of cross drainage works viz Syphon aquaduct and Canal syphon.

MODULE 4 - STRUCTURES ON PERVIOUS FORMATIONS

Bligh's creep theory,limitations, Khoslas's theory of independent variable,Khosla's corrections,Design of Weir and Barrages :design of waterways and crest levels,design of impervious floors and protection works.

MODULE 5 - CANAL STRUCTURES AND HYDROPOWER PLANTS

Design of canal falls, Regulators, Cross drainage works, Introduction of Hydropower development, , general features of hydro-electric schemes, selection of turbines.

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1 - identify the necessity of reservoir planning

CO2 – analyse the importance of hydraulic structures

CO3 – design various types of hydraulic structures

CO4 – compare the various aqueducts and identify its advantages and applications

CO5 – integrate relevant concept and methodologies in the area of hydraulics, hydrology and geotechnical engineering.

REFERENCE BOOKS:

1. Arora, K.R., Irrigation, Water Power and Water Resources Engineering, Standard Publishers Distributors, Delhi
2. Modi, P.N., Introduction To Water Resources And Waterpower Engineering, Standard Publication, Delhi
3. Garg, S.K., Irrigation Engineering and Hydraulic Structures Khanna Publishers
4. Asawa, G, L Irrigation And Water Resources Engineering, New Age Int. Ltd.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering	2	2	3	3	2	2
PO2	Problem analysis	1	1	3	3	1	2
PO3	Design / development of solutions	2	2	3	3	1	2
PO4	Investigation	2	1	3	2	2	2
PO5	Modern Tool Usage	-	2	2	2	2	2
PO6	Engineer and Society	-	-	3	3	3	3
PO7	Environment and Sustainability	1	3	1	1	2	2
PO8	Ethics	-	-	-	-	1	1
PO9	Individual and Team work	-	-	-	-	3	3
PO10	Communication	-	-	-	-	2	2
PO11	Project Management and Finance	-	2	3	3	3	3
PO12	Life Long Learning	2	2	1	1	3	2
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3

PSO2	Critical analysis of Civil Engineering problems and	2	3	3	3	2	3
PSO3	Conceptualization and evaluationof engineering solutions to Civil Engineering Issues	1	2	2	2	2	2

GROUP C ENVIRONMETNAL ENGINEERING

ACIT 3122	Municipal Solid Waste Management	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:

- To make the students conversant with different aspects of the types, source generation, storage, collection, transport, processing and disposal of municipal solid waste.

MODULE I - SOURCES AND TYPES
Sources and types of municipal solid wastes-waste generation rates-factors affecti generation, characteristics-methods of sampling and characterization; Effects improper disposal of solid wastes-Public health and environmental effects. Elements solid waste management –Social and Financial aspects – Municipal solid waste (M& rules – integrated management-Public awareness; Role of NGO"s.

MODULE II - ON-SITE STORAGE AND PROCESSING
On-site storage methods – Effect of storage, materials used for containers segregation of solid wastes – Public health and economic aspects of open storage waste segregation and storage – case studies under Indian conditions – sour reduction of waste – Reduction, Reuse and Recycling.

MODULE III - COLLECTION AND TRANSFER
Methods of Residential and commercial waste collection – Collection vehicles Manpower– Collection routes – Analysis of collection systems; Transfer stations Selection of location, operation & maintenance; options under Indian conditions – Fie problems- solving.

MODULE IV - OFF-SITE PROCESSING
Waste processing – Physical Processing techniques an Equipments; Resource recovery from solid waste composting and biomethanatio Thermal processing options – case studies under Indian conditions.

MODULE V - DISPOSAL
Land disposal of solid waste; Sanitary landfills – site selection, design and operation sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landf bioreactor– Dumpsite Rehabilitation

COURSE OUTCOMES:
At the end of the course the student will be able to
CO1 - understand the nature and characteristics of municipal solid wastes, i health hazards and the regulatory requirements regarding municipal solid waste management
CO2 - manipulate collection and transfer of municipal solid wastes and plan the same for an area.
CO3 - categorize of the various offsite processing techniques.
CO4 – hypothesize the various disposal methods and its associated managerial aspects.
CO5 – know about the various onsite storage and processing techniques.

TEXTBOOKS:

1. Tchobanoglous, G., Theisen, H. M., and Eliassen, R. "Solid. Waste Engineering Principles and Management Issues". McGraw Hill, New York, 199
2. Vesilind, P.A. and Rimer, A.E., "Module Operations in Resource Recove Engineering", Prentice Hall,

Inc., 1981
3. Paul T Willams, "Waste Treatment and Disposal", John Wiley and Sons, 2000

REFERENCES:

1. Government of India, "Manual on Municipal Solid Waste Management CPHEEO, Ministry of Urban Development, New Delhi, 2000.
2. Bhide A.D. and Sundaresan, B.B. "Solid Waste Management Collection Processing and Disposal, 2001
3. Manser A.G.R. and Keeling A.A.," Practical Handbook of Processing an Recycling of Municipal solid Wastes", Lewis Publishers, CRC Press, 1996

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Over all Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAMOUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences		3				3
PO2	Problem analysis	3	2		2	2	2
PO3	Design / development of solutions			3			3
PO4	Investigation		2			2	2
PO5	Modern Tool Usage		2		2		2
PO6	Engineer and Society	2			2		2
PO7	Environment and sustainability	2			2		2
PO8	Ethics				2		2
PO9	Individual and Team work		2	2			2
PO10	Communication					1	1
PO11	Project Management and Finance				2		2
PO12	Life Long Learning					1	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	3	3		3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	2	2	2
PSO3	Conceptualization and evaluationof engineering solutions to Civil Engineering Issues		3	3			3

ACIT 3123	**Industrial Waste Management**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:

- To impart knowledge on sources and characteristics of various industrial wast and strategies for its

treatment and management.

MODULE I INTRODUCTION

Types of industries and industrial pollution – Characteristics of industrial wastes Population equivalent – Bioassay studies – effects of industrial effluents on stream sewer, land, sewage treatment plants and human health – Environmental legislatio related to prevention and control of industrial effluents and hazardous wastes

MODULE II CLEANER PRODUCTION

Waste management Approach – Waste Audit – Volume and strength reduction Material and process modifications – Recycle, reuse and byproduct recovery Applications.

MODULE III POLLUTION FROM MAJOR INDUSTRIES

Sources, Characteristics, waste treatment flow sheets for selected industries such Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Pape distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewat reclamation concepts

MODULE IV TREATMENT TECHNOLOGIES

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combin treatment of industrial and municipal wastes – Residue management – Dewatering Disposal

MODULE V HAZARDOUS WASTE MANAGEMENT

Hazardous wastes - Physio chemical treatment – solidification – incineration – Secu land fills

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1 – have insight into the pollution from major industries including the source characteristics of pollutants and its related legislations.

CO2 - able to guide for a conceptual waste management approach by clean production techniques.

CO3 – recall the sources, characteristics and treatment of the waste generated by various industries.

CO4 - categorize the various treatment methodologies for organic and inorganic wastes.

CO5 - understand the hazardous wastes – its treatment and disposal.

TEXT BOOKS:

1. Rao M. N. & Dutta A. K. , “Wastewater Treatment”, Oxford - IBH Publicatio 1995.
2. Eckenfelder W.W. Jr., “Industrial Water Pollution Control”, McGraw Hill Bo Company, New Delhi, 2000.
3. Patwardhan. A.D., Industrial Wastewater Treatment", Prentice Hall of India, Ne Delhi 2010.

REFERENCES:

1. Shen T.T., “Industrial Pollution Prevention”, Springer, 1999.
2. Stephenson R.L. and Blackburn J.B., Jr., “Industrial Wastewater Systems Han book”, Lewis Publisher, New York, 1998
3. Freeman H.M., “Industrial Pollution Prevention Hand Book”, McGraw Hill Inc New Delhi, 1995.
4. Bishop, P.L., “Pollution Prevention: Fundamental & Practice”, McGraw Hi 2000.
5. Pandey, "Environmental Management" Vikas Publications, 2010.
6. Industrial Wastewater Management, Treatment and Disposal",(WEF - MOP FD3) McGraw Hill, 2008.

COs- PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3										3	1	2		3
2		3	2	2				3	3	2				2	
3	2	3	3						3	2	2	3		2	3
4	2		3		2		2	3	3						
5	2	3	2	3		1	2			2	3		3		3
Avg.	2	3	3	2	2	1	2	3	3	2	3	2	2	2	3

ACIT 4128	Air Pollution Management	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:

- This subject covers the sources, characteristics and effects of air and nois pollution and the methods of controlling the same.
- The student is expected to know about source inventory and control mechanism.

MODULE I SOURCES AND EFFECTS OF AIR POLLUTANTS
Classification of air pollutants – Particulates and gaseous pollutants – Sources of a pollution – Source inventory – Effects of air pollution on human beings, material vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants Principles.

MODULE II DISPERSION OF POLLUTANTS
Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants Dispersion models – Applications.

MODULE III AIR POLLUTION CONTROL
Concepts of control – Principles and design of control measures – Particulates contr by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selectio criteria for equipment - gaseous pollutant control by adsorption, absorptio condensation, combustion – Pollution control for specific major industries.

MODULE IV AIR QUALITY MANAGEMENT
Air quality standards – Air quality monitoring – Preventive measures - Air pollutio control efforts – Zoning – Town planning regulation of new industries – Legislation a enforcement – Environmental Impact Assessment and Air quality

MODULE V NOISE POLLUTION
Sources of noise pollution – Effects – Assessment - Standards – Control methods Prevention

COURSE OUTCOMES:
At the end of the course the student will be able to
CO1 – understand air pollutants – its nature and characteristics, analysis and sampling techniques, effects.
CO2 - able to identify and determine the dispersion of pollutants.CO3 – have a thorough knowledge on the various air pollution control equipments
CO4 – develop awareness on air quality standards, its monitoring and associate legislations.
CO5 - describe noise pollution – its sources, effects, control and standards.

TEXT BOOKS:

1. Anjaneyulu, D., “Air Pollution and Control Technologies”, Allied Publisher Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., Ne Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Del 1996.

REFERENCES:

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, Ne Yark, 1997.
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw H Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering McGraw Hill, New Delhi, 1985.
4. Garg, S.K., “Environmental Engineering Vol. II”, Khanna Publishers, New Delh 1998
5. Mahajan, S.P., “Pollution Control in Process Industries”, Tata McGraw Hill, Ne Delhi, 1991.
6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

COs- PO’s & PSO’s MAPPING

CO’s	PO’s												PSO’s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3				3			2	1	2			2		
2	2			3		2						2	1	2	2
3	2		3		3		1				2		2	2	2
4	2		3		3		1				2		2	2	2
5	3	3	2	3	2					2			2		
Avg.	2	3	3	3	3			2	1	2	2	2	2	2	2

ACIT 4129	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:

- To impart knowledge on Environmental management and Environmental Impact Assessment.

MODULE I INTRODUCTION
Impact of development projects – Sustainable development- Need for Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA-Stages of EIA, Types of EIA

MODULE II METHODOLOGIES
Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

MODULE III PREDICTION AND ASSESSMENT
Assessment of Impact on land, water, air, social & cultural activities and on flora & fauna- Mathematical models- Public participation

MODULE IV ENVIRONMENTAL MANAGEMENT PLAN
Plan for mitigation of adverse impact on environment – Options for mitigation of impact on water,air, land and on flora & fauna - Addressing the issues related to the Project Affected People. Post project monitoring

MODULE V CASE STUDIES
EIA for infrastructure projects – Dams – Highways – Multi-storey Buildings – Water Supply and Drainage Projects – Waste water treatment plants, STP.

COURSE OUTCOMES:
At the end of the course the student will be able to
CO1 - carry out scoping and screening of developmental projects for environmental and social assessments
CO2 - explain different methodologies for environmental impact prediction and assessment
CO3 - plan environmental impact assessments and environmental management plans
CO4 - evaluate environmental impact assessment reports
CO5 - compile projects with less environmental impact.

TEXTBOOKS:

1. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc., New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

REFERENCES:

1. John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.
2. "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington,D.C., 1991.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.

COs- PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						2	3	3					2		
2	3	2	3	2	2			3	2			1		2	2
3		2	3	2	2			3	2			1		2	
4			3		3	2	2	2	2	1	1			2	2
5	3			2				2							
Avg.	3	2	3	2	2	2	2	3	2	1	1	1	2	2	2

GROUP D TRANSPORTATION ENGINEERING

ACIT 3124	Urban Planning and Development	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:
- To enable students to have the knowledge on planning process and
- Tto introduce to the students about the regulations and laws related to Urban Planning.

MODULE I BASIC ISSUES
Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl,

Peri - urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

MODULE II PLANNING PROCESS
Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, COURSE OBJECTIVES, Delineation of Planning Areas, Surveys and Questionnaire Design.

MODULE III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION
Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones- Development of small town and smart cities-case studies

MODULE IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS
Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

MODULE V LEGISLATION, DEVELOPMENTAND MANAGEMENT OF URBAN SYSTEM
Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.
COURSE OUTCOME:
The students completing the course will have the ability to
CO1:Describe basic issues in urban planning
CO2:Analyze the plans for urban and rural development and
CO3:Plan and analyse socio economic aspects of urban and rural planning
CO4:Design of urban development projects.
CO5:Understanding the urban development projects.

TEXTBOOKS:

1. Goel, S.L Urban Development and Management, Deep and Deeppublications, New Delhi2002
2. George Chadwick, A Systems view of planning, Pergamon press, Oxford1978
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication,Delhi, 2001
4. Edwin S.Mills and Charles M.Becker, Studies in Urban development, AWorld Bank publication,1986

REFERENCES:

1. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
2. Goel S.L., Urban Development and Management, Deep and DeepPublications, New Delhi,2002
3. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai,2005
4. CMDA, Second Master Plan for Chennai, Chennai2008

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Over all Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAMOUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	2	3		3	3
PO2	Problem analysis					2	2
PO3	Design / development of solutions		3	3	2	1	2
PO4	Investigation		2		2	2	2
PO5	Modern Tool Usage				2		2
PO6	Engineer and Society	3	3	2		3	3

PO7	Environment and sustainability	3	2	3	2	2	2
PO8	Ethics		2		2	2	2
PO9	Individual and Team work	3	2	2	3	2	2
PO10	Communication			2		2	2
PO11	Project Management and Finance	3	3	2	3	3	3
PO12	Life Long Learning		2	1	2	2	2
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	2	2	1	2
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	2	1	1	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	2	3	2	2	2

ACIT 3125	**Traffic Engineering and Managment**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT3117 Transportation Engineering

COURSE OBJECTIVES:

- To give an overview of Traffic engineering, traffic regulation, management and traffic safety with integrated approach in traffic planning as well.

MODULEI TRAFFIC PLANNING ANDCHARACTERISTICS

Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India – Integrated planning of town ,country ,regional and all urban infrastructure – Towards Sustainable approach. – land use & transport and modal integration.

MODULEII TRAFFIC SURVEYS

Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.

MODULE III TRAFFIC DESIGN AND VISUAL AIDS

Intersection Design - channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation - Traffic signs including VMS and road markings – Significant roles of traffic control personnel - Networking pedestrian facilities & cycle tracks.

MODULE IV TRAFFIC SAFETY AND ENVIRONMENT

Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport.

MODULE V TRAFFIC MANAGEMENT

Area Traffic Management System - Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Dire and indirect methods – Congestion and parking pricing – All segregation methods- Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.

COURSE OUTCOMES:

On completing this course, the Students will be able to
CO1 - Analyse the road and road user characteristics and plan for an integrated road transport system.
CO2 - Understand the concept, application and significance of traffic surveys.
CO3 - Design the various components of road transportation system.
CO4 - Investigate the causes, effects and preventive measures for roadaccidents
CO5 - Develop Traffic management Systems

TEXT BOOKS:

1. Kadiyali.L.R. "Traffic Engineering and Transport Planning", KhannaPublishers, Delhi,2013
2. Indian Roads Congress (IRC) Specifications: Guidelines andSpecial Publications on Traffic Planning andManagement.
3. Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design",Macmillan PressLtd.1996.

REFERENCES:

1. Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, Principlesof Highway
2. Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi,2011
3. Garber and Hoel, "Principles of Traffic and Highway Engineering",CENGAGE Learning, New Delhi,2010
4. SP:43-1994, IRC Specification, "Guidelines on Low-cost Traffic Management Techniques" for Urban Areas,1994
5. John E Tyworth, "Traffic Management Planning, Operations andcontrol", Addison Wesly Publishing Company,1996
6. Hobbs.F.D. "Traffic Planning and Engineering", University of Brimingham, Peragamon Press Ltd,2005

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Over all Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES (PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	2	2	3
PO2	Problem analysis	2	3	2	3	2	2
PO3	Design / development of solutions	2	3	3	3	1	3
PO4	Investigation	2	3	2	3	1	2
PO5	Modern Tool Usage	1	3	1	3	1	2
PO6	Engineer and Society	1	2	1	2	2	2
PO7	Environment and sustainability	1	1	1	2	3	1
PO8	Ethics	1	2	2	2	3	2
PO9	Individual and Team work	2	3	2	2	1	2
PO10	Communication	2		3	3	1	2
PO11	Project Management and Finance	3	3	2	3	2	3
PO12	Life Long Learning	1	1	1	1	1	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	2	2	2	2
PSO2	Critical analysis of Civil Engineering problems and innovation	3	2	2	3	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	2	3	2	3

ACIT 4130	**Design of Bridges**	**L**	**T**	**P**	**C**	**Total Marks**

		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT3110 Structural Analysis I
ACIT3111 Foundation Engineering
ACIT3113 Design of Reinforced Concrete Elements
ACIT3115 Structural Analysis II
ACIT3116 Design of Steel Structural Elements

COURSE OBJECTIVES:

- To make the student to know about various bridge structures, selection of appropriate bridge structures and its design for given site conditions.

MODULE I INTRODUCTION

History of bridges - Components of a bridge - Classification of road bridges - Selection of site and initial decision process - Survey and alignment; Geotechnical investigations and interpretations. River Bridge: Selection of Bridge site and planning - Collection of bridge design data - Hydrological calculation- Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate and indeterminate structures - Transverse distribution of Live loads among deck longitudinal - Load combinations for different working state and limit state designs Railway Bridges: Loadings for Railway Bridges; Railroad data. Pre-design considerations - Railroad vs. Highway bridges.

MODULE II SUPERSTRUCTURES

Bridge decks – Structural forms and behaviour – Choices of superstructure types – Behaviour and modeling of bridge decks – Simple beam model – Plate model – Grillage method – Finite Element method - Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge.- Transverse Analysis of Bridge - Temperature Analysis - Distortional Analysis - Effects of Differential settlement of supports - Reinforced earth structures

MODULE III DESIGN OF STEEL BRIDGES

Design of Truss Bridges – Design of Plate girder bridges.

MODULE IV DESIGN OF RC AND PSC BRIDGES

Design of slab bridges – T beam bridges – PSC bridges

MODULE V SUBSTRUCTURE, BEARINGS AND EXPANSION JOINTS, PARAPETS AND RAILINGS

Substructure - Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation- Simply supported bridge- Continuous Bridge - Bearings and Expansion Joints - Different types of bridge bearings and expansion joints - Parapets and Railings for Highway Bridges

OUTCOMES:

On successful completion of this course, students will be able to:

- To Evaluate the loads on bridges and selection of type of bridge for the site condition
- Analyze the super structure by various methods.
- Design the trussed bridge and plate girder bridges
- Design reinforced concrete slab and T beam bridges and prestressed concrete bridges
- Decide the appropriate sub structural systems, bearings and expansion joints for the bridges.

TEXTBOOKS:

1. Johnson Victor D., “Essentials of Bridge Engineering”, Oxford and IBH Publishing Co., New Delhi, 2009.
2. Jagadeesh. T.R. and Jayaram. M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013

REFERENCES:

1. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 1996.
3. Rajagopalan. N. "Bridge Superstructure", Alpha Science International, 2006

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	3	3	3	3	3	3
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	3	3	3	3	3	3
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	3	3	3	3	3	3
PO10	Communication	2	2	2	2	2	2
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	1	1	1	1	1
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	3	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT 4131	**Pavement Engineering**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:

ACIT3117 Transporation Engineering

COURSE OBJECTIVES:

- Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements.
- Further, he/she will be in a position to assess quality and serviceability conditions of roads.

MODULE I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM

Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS

Flexible pavement design factors influencing design of flexible pavement, Empirical - Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS

Cement concrete pavements factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE

Pavement Evaluation - causes of distress in rigid and flexible pavements – Evaluation based on Surface

Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index. - Pavement maintenance (IRC Recommendations only).

UNIT V STABILIZATION OF PAVEMENTS

Stabilisation with special reference book to highway pavements – Choice of stabilizers – Testing and field control Stabilisation for rural roads in India – use of Geosynthetics in roads.

COURSE OUTCOMES:

Students will have adequate knowledge

CO1: Applying the types of rigid and flexible pavements
CO2: Analyze how to design of rigid pavements.
CO3: Understanding the various techniques to evaluate performance of pavements.
CO4: Determine the causes of distress in rigid and flexible pavements.
CO5: Analyze how to design of flexible pavements

TEXT BOOKS:

1. Wright P.H. "Highway Engineers", John Wiley and Sons, Inc., New York, 1996.
2. Khanna, S.K., Justo C.E.G. and Veeraragavan. A., "Highway Engineering", Nem Chand and Brothers, 10th Edition, Roorkee, 2014.
3. Kadiyali, L.R. „Principles and Practice of Highway Engineering", Khanna tech.Publications, New Delhi, 1989.

REFERENCES:

1. Yoder, R.J. and Witchak M.W. "Principles of Pavement Design", John Wiley 2000.
2. IRC-37–001,The Indian roads Congress, Guidelines for the Design of Flexible Pavements, New Delhi, 2001
3. IRC 58-1998. The Indian Road Congress, Guideline for the Design of Rigid Pavements for Highways, New Delhi, 1991 4. Rajib B.Mallick, Tahar El-Korchi, "Pavement Engineering: Principles and Practice, 2nd Edition, CRC Press, 2013.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Over all Correlation of Cos to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAMOUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	1	3	2	3	3
PO2	Problem analysis			3	3	2	3
PO3	Design / development of solutions		3	3	2	1	3
O4	Investigation			2	2	1	2
PO5	Modern Tool Usage		2	3	2	2	2
PO6	Engineer and Society	3			3	3	3
PO7	Environment and sustainability	1	1	2	3	1	2
PO8	Ethics			3	3	3	3
PO9	Individual and Team work	2	2				2
PO10	Communication					1	1
PO11	Project Management and Finance			2	3	3	3
PO12	Life Long Learning		2	3	3	3	3
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	2	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	3	3	1	3

PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues		1	1	2	2	2

GROUP E CONSTRUCTION MANAGEMENT

ACIT3127	Construction Management	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
NIL

COURSE OBJECTIVES:

- To study the elements of construction project management consisting of owners' perspective, Organization, design and construction procedures, resource utilization and cost estimation

MODULE I CONSTRUCTION PROJECT MANAGEMENT
Introduction – Project Life Cycle – Major Types of construction – Selection of professional services – Construction contractors – Financing of constructed facilities – Legal & Regulatory requirements – Role of project managers

MODULE II PROJECT PLANNING & ORGANIZATION
Development of project plan, objective and conception– Programming – Scheduling – Project Organization – Project budget fund flow statement – Controlling system.

MODULE III LABOUR, MATERIAL & EQUIPEMENT UTILIZATION
Introduction – Labour Productivity – Factors affecting job site productivity – Materials Management – Material procurement & Delivery – Inventory control – Plant & Equipment management

MODULE IV CONTRACTS
Introduction – Types of Contract – Contract document – Specifications – Important conditions of contract – Tender and tender document – Deposits by the contractor – Arbitration – M. Book, R.A Bills & Advances – Muster Roll – Stores

MODULE V NETWORK ANALYSIS
Introduction – Basic concepts of network analysis – CPM and PERT – Use of CPM & PERT Techniques – Problems, and prospects and applications of CPM & PERT – Introduction to software applications in project Management

COURSE OUTCOMES:
Students must gained knowledge on
CO1. To understand the owner view a project in consideration with project life cycle, construction agencies legal requirements etc.
CO2. To aquire the various types of organization and their impact on and suitability to construction projects
CO3. To design and construction procedures along with labour material and equipment utilization
CO4. To understand the elements of cost of a project.
CO5. To design the network analysis.

TEXT BOOKS:
1. S. Sanga Reddy & Meyyappan, "Construction Management", Kumaran Publications, 2009.

2. Gahlot, P.S & Dhir, D.M., "Construction Planning and Management", Wiley Eastern Limited, 1992.
3. Chitkara, K.K., "Construction Project Management", Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1992.
4. Punmia B.C., "Project Planning and Control with PERT and CPM", Laxmi Publications, New Delhi, 1987

REFERENCES:

1. Jerome D. Wiest & K. Levy, "Management Guide to PERT/CPM",
2. Clough R.H. & Sears. G.A, "Construction Project Management" 2008

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	2	-	2	2	2
PO2	Problem analysis	3	3	3	3	2	3
PO3	Design / development of solutions	-	-	3	-	2	2
PO4	Investigation	-	-	-	2	-	2
PO5	Modern Tool Usage	3	3	3	3	-	3
PO6	Engineer and Society	2	2	-	-	-	2
PO7	Environment and Sustainability	-	-	1	2	-	1
PO8	Ethics	2	2	-	-	-	2
PO9	Individual and Team work	2	2	-	-	2	2
PO10	Communication	3	3	-	-	-	3
PO11	Project Management and Finance	3	3	3	3	2	3
PO12	Life Long Learning	1	1	-	2	-	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Construction Engineering & Management discipline	2	2	3	-	2	2
PSO2	Critical analysis of Construction management problems and innovation	2	2	3	-	2	2
PSO3	Conceptualization and evaluation of engineering solutions to Construction Issues	3	3	2	-	2	3

ACIT3128	Concrete Technology	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
ACIT2103 Construction Materials

COURSE OBJECTIVES:

- To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

MODULE I CONSTITUENT MATERIALS
Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements-Water- Quality of water for use in concrete.

MODULE II CHEMICAL AND MINERAL ADMIXTURES
Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties

MODULE III PROPORTIONING OF CONCRETE MIX
Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples

MODULE IV FRESH AND HARDENED PROPERTIES OF CONCRETE
Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young‟s Modulus.

MODULE V SPECIAL CONCRETES
Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete - SIFCON-Shotcrete – Polymer concrete - High performance concrete- Geopolymer Concrete

COURSE OUTCOMES:
The student will possess the knowledge on
CO1: properties of materials required for concrete tests on those materials and design procedures for making conventional and special concretes.
CO2: Students will be able to classify the constituent materials of concrete upon testing using standard procedures and infer about their effects on the properties of concrete.
CO3: Students will be able to choose admixtures to enhance the specific property of concrete.
CO4: Students will be able to design and develop a concrete mix confirming to BIS, for the supplied data.
CO5: Students will be able to extend quality control on concreting operations making use of standard test procedure for testing concrete in fresh and hardened state.
Students will be able to identify the type and situations that warrant special concretes

TEXT BOOKS:

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003

REFERENCES:

1. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2007
2. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
3. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
4. IS10262-2009 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New

Delhi, 1998

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	3	3	3	3	3	3
PO2	Problem analysis	1	1	2	1	1	1
PO3	Design / development of solutions	1	1	3	1	1	2
PO4	Investigation	2	1	3	1	1	2
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Engineer and Society	3	3	3	3	3	3
PO7	Environment and Sustainability	3	3	3	3	3	3
PO8	Ethics	2	1	1	2	2	2
PO9	Individual and Team work	1	1	1	1	1	1
PO10	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	1	1	2	1
PO12	Life Long Learning	2	2	2	2	2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	2	2	2
PSO3	Conceptualization and evaluationof engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT4132	Lean Construction Concepts Tools and practices	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
ACIT3127 Construction Management

COURSE OBJECTIVES:

- To impart knowledge about the basics of lean construction, principles, tools and techniques, and implementation in the construction industry.

MODULE I INTRODUCTION

Introduction and overview of the construction project management -Review of Project Management& Productivity Measurement Systems – Productivity in Construction– Daily Progress Report-The state of the industry with respect to its management practices –construction project phases - Essential features of contemporary construction management techniques - The problems with current construction management techniques– Current productionplanning.

MODULE II LEAN MANAGEMENT

Introduction to lean management – Toyota's management principle-Evolution of lean in construction industry - Production theories in construction –Lean construction value - Value in construction - Target value design – Lean project delivery system- Forms of waste in construction industry – Waste Elimination.

MODULE III CORE CONCEPTS IN LEAN

Concepts in lean thinking – Principles of lean construction – Variability and its impact – Traditional construction and lean construction – Traditional project delivery - Lean construction and workflow reliability – Work structuring – Production control.

MODULE IV LEAN CONSTRUCTION TOOLS AND TECHNIQUES

Value Stream Mapping – Work sampling – Last planner system – Flow and pull based production – Last Planner System – Look ahead schedule – constraint analysis – weekly planning meeting- Daily Huddles – Root cause analysis – Continuous improvement – Just in time.

MODULE V LEAN CONSTRUCTION IMPLEMENTATION

Lean construction implementation- Enabling lean through information technology – Lean in design - Design Structure Matrix Location Based Management System-BIM (Building Information Modelling) - IPD (Integrated Project Delivery) – Sustainability through lean construction approach

COURSE OUTCOMES:

On completion of this course, the student is expected to be able to
CO1 - Explain the contemporary management techniques and the issues in present scenario.
CO2 -Apply the basics of lean management principles and their evolution from manufacturing industry to construction industry.
CO3 - Develops a better understanding of core concepts of lean construction tools and techniques and their importance in achieving better productivity.
CO4 - Apply lean techniques to achieve sustainability in construction projects.
CO5 - Apply lean construction techniques in design and modeling

REFERENCES:

1. Corfe, C. and Clip, B., Implementing lean in construction: Lean andthe sustainability agenda, CIRIA,2013.
2. Shang Gao and Sui Pheng Low, Lean Construction Management: TheToyota Way, Springer,2014.
3. Dave, B., Koskela, L., Kiviniemi, A., Owen, R., andTzortzopoulos, P.,Implementing lean in construction: Lean construction and BIM,CIRIA, 2013.
4. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., Leanconstruction tools and techniques,2002.
5. Salem, O., Solomon, J., Genaidy, A. and Luegring, M., Siteimplementation and Assessment of Lean Construction Techniques, Lean Construction Journal,2005

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	3	2	3	3	3
PO2	Problem analysis	-	1	2	1	1	1
PO3	Design / development of solutions	1	3	3	3	2	3
PO4	Investigation	1	2	1	2	2	2
PO5	Modern Tool Usage	-	1	1	2	2	2
PO6	Engineer and Society	2	2	1	1	2	2
PO7	Environment and Sustainability	3	2	1	3	3	3
PO8	Ethics	1	-	-	1	1	1
PO9	Individual and Team work	1	1	-	1	-	1
PO10	Communication	-	1	-	1	1	1
PO11	Project Management and Finance	2	1	3	3	3	3
PO12	Life Long Learning	1	2	1	2	2	2
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	3	3	3	3	3

ACIT4133	**Construction Planning, Scheduling And Control**	**L**	**T**	**P**	**C**	**Total Marks**
		3	**0**	**0**	**3**	**100**

PRE-REQUISITES:
ACIT3127 Construction Management

COURSE OBJECTIVES:

- To make the students to learn about planning of construction projects, scheduling procedures and techniques, cost and quality control projects and use of project informationas decision making tool.

MODULE I CONSTRUCTION PLANNING

Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities- coding systems.

MODULE II SCHEDULING PROCEDURES AND TECHNIQUES

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process –Introduction to application software.

MODULE III COST CONTROL MONITORING AND ACCOUNTING

The cost control problem-The project Budget-Forecasting for Activity cost control – financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information.

MODULE IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specificatio Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

MODULE V ORGANIZATION AND USE OF PROJECT INFORMATION

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

COURSE OUTCOMES:

CO1: Understand basic concepts of construction planning.
CO2: schedule the activities using network diagrams,
CO3: Forecast and control the cost of the project,
CO4: Understand the quality control and safety during construction.
CO5: Organize information in centralized database management systems.

TEXT BOOKS:

1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw H Publishing Co., New Delhi, 2005
2. Srinath,L.S., "Pert and CPM Principles and Applications", Affiliated East West Press, 2001

REFERENCES:

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.
2. Moder.J., Phillips. C. and Davis E, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., 3rd Edition, 1985.
3. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons, 1986.

Halpin,D.W., "Financial and Cost Concepts for Construction Management", John Wiley and Sons, New York, 1985.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	3	3	2	2	2
PO2	Problem analysis	2				3	2
PO3	Design / development of solutions					2	1
PO4	Investigation	3	2	2		3	2
PO5	Modern Tool Usage					2	1
PO6	Engineer and Society	2				2	1
PO7	Environment and Sustainability	2	2	3			2
PO8	Ethics						
PO9	Individual and Team work					2	1
PO10	Communication						
PO11	Project Management and Finance			2	2	3	2
PO12	Life Long Learning	2	2			2	2
PROGRAM SPECIFIC OUTCOMES(PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3

PSO2	Critical analysis of Civil Engineering problems and innovation				3	3	2
PSO3	Conceptualization and evaluationof engineering solutions to Civil Engineering Issues		2	2		3	2

ACIT3129	Advanced Construction Techniques	L	T	P	C	Total Marks
		3	0	0	3	100

PRE-REQUISITES:
ACIT2105 Construction Technology

COURSE OBJECTIVES:
To study and understand the latest construction techniques applied to engineering construction for sub structure, super structure, special structures, rehabilitation and strengthening techniques and demolition techniques.

MODULE I SUB STRUCTURE CONSTRUCTION
Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - Piling techniques - Driving well and caisson - sinking cofferdam - cable anchoring and grouting - Driving diaphragm walls, Sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - well points - Dewatering for underground open excavation.

MODULE SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS
Vacuum dewatering of concrete flooring – Concrete paving technology – Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections – Erection techniques of tall structures, Large span structures – launching techniques for heavy decks – in-situ prestressing in high rise structures, Post tensioning of slab- aerial transporting – Handling and erecting lightweight components on tall structures.metal deck concrete flooring/roofing

MODULE III CONSTRUCTION OF SPECIAL STRUCTURES
Erection of lattice towers - Rigging of transmission line structures – Construction sequence in cooling towers, Silos, chimney, sky scrapers - Bow string bridges, Cable stayed bridges – Launching and pushing of box decks – Construction of jetties and break water structures – Construction sequence and methods in domes – Support structure for heavy equipment and machinery in heavy industries – Erection of articulated structures and space decks, precast concrete erection/temporary propping/connections.

MODULE IV REHABILITATION AND STRENGTHENING TECHNIQUES
Seismic retrofitting - Strengthening of beams - Strengthening of columns - Strengthening of slab - Strengthening of masonry wall, Protection methods of structures, Mud jacking and grouting for foundation – Micro piling and underpinning for strengthening floor and shallow profile - Sub grade water proofing, Soil Stabilization techniques.

MODULE V DEMOLITION
Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.

COURSE OUTCOMES:

On completion of this course the students will know
CO1. To understand the modern construction techniques to be used in the construction of buildings
CO2. To identify the modern construction techniques to be used in the special structures

CO3. To compare the modern construction techniques to be used in the rehabilitation
CO4.To relate the modern construction techniques to be used in the strengthening techniques
CO5. To modify the modern construction techniques to be used in the demolition.

TEXT BOOKS:

1. S. Sanga Reddy & Meyyappan, "Construction Management", Kumaran Publications, 2009.
2. Gahlot, P.S & Dhir, D.M., "Construction Planning and Management", Wiley Eastern Limited, 1992.
3. Chitkara, K.K., "Construction Project Management", Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1992.
4. Punmia B.C., "Project Planning and Control with PERT and CPM", Laxmi Publications, New Delhi, 1987

REFERENCES:

1. Jerome D. Wiest & K. Levy, "Management Guide to PERT/CPM",
2. Clough R.H. & Sears. G.A, "Construction Project Management" 2008

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	2	1	2	2	1	2
PO2	Problem analysis	2	-	3	3	3	3
PO3	Design / development of solutions	1	-	3	3	3	3
PO4	Investigation	3	2	2	3	3	3
PO5	Modern Tool Usage	3	2	3	2	2	2
PO6	Engineer and Society	2	2	3	1	2	2
PO7	Environment and Sustainability	2	3	2	2	1	2
PO8	Ethics	-	-	1	1	1	1
PO9	Individual and Team work	1	1	2	1	2	1
PO10	Communication	1	1	2	1	2	1
PO11	Project Management and Finance	2	2	3	2	3	2
PO12	Life Long Learning	1	1	2	1	2	1
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	2	3	3	2	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	3	3	3	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	3	2	3	3	2	3