ACADEMIC REGULATIONS & CURRICULUM

(Applicable to the Students Admitted from the Academic Year 2015-16)

CIVIL ENGINEERING

(B.Tech. Programme)

Maharaj Vijayaram Gajapathi Raj College of Engineering (Autonomous)

Approved by AICTE, New Delhi, and Permanently Affiliated to JNTUK, Kakinada
Listed u/s 2(f) & 12(B) of UGC Act 1956.
Vijayaram Nagar Campus, Chintalavalasa, Vizianagaram - 535005, Andhra Pradesh

Vision

MaharajVijayaramGajapathi Raj College of Engineering strives to become a centre par excellence for technical education where aspiring students can be transformed into skilled and well-rounded professionals with strong understanding of fundamentals, a flair for responsible innovation in engineering practical solutions applying the fundamentals, and confidence and poise to meet the challenges in their chosen professional spheres.

Mission

The management believes imparting quality education in an atmosphere that motivates learning as a social obligation which we owe to the students, their parents/guardians and society at large and hence the effort is to leave no stone unturned in providing the same with all sincerity. Towards that end, the management believes special focus has to be on the following areas:

- Have on-board staff with high quality experience and continuously updating themselves with latest research developments and sharing that knowledge with students.
- Having a well stream-lined teaching learning process that is continuously assessed for effectiveness and fine-tuned for improvement.
- Having state-of-the-art lab and general infrastructure that gives students the necessary tools and means to enhance their knowledge and understanding.
- Having a centralized department focused on improving placement opportunities for our students directly on campus and coordinating the training programs for students to complement the curriculum and enhance their career opportunities.
- Having advanced research facilities and more importantly atmosphere to encourage students to pursue self-learning on advanced topics and conduct research.

ABOUT THE INSTITUTION:

Maharaja Alak Narayan Society of Arts and Science (MANSAS) is an Educational Trust founded by Dr. (late) P.V.G Raju, Raja Saheb of Vizianagaram in the hallowed memory of his father Maharaja Alak Narayan Gajapati with a view to confound socio-economic inequalities in the Vizianagaram principality executing a trust deed on 12-11-1958 duly established Maharajah's College and other Educational Institutions in and around Vizianagaram. The Trust is a charitable one published under Section 6 a (1) of A.P Charitable and Hindu Religious Institutions and Endowment Act 30 of 1987.

The object of the Trust is to manage the properties of educational Institutions under it and to promote and advance the cause of education in general, besides awarding scholarships to deserving students enabling them to undergo special training in science and industries in and out of India. The Trust has made an uncompromising contribution to the nation by presenting the stalwarts.

Trust offers KG to PhD level education in Arts, Sciences, Law, Pharmacy, Humanities Education, Engineering and Management and presently houses 12 Educational Institutions. MVGR College of Engineering is one of the 12 institutes.

MaharajVijayaramGajapathi Raj (MVGR) College of Engineering was established in the year 1997 by MaharajAlak Narayan Society for Arts and Sciences (MANSAS) to impart quality technical education. The Institution is located in lush green, serene and pollution free environment spread over 60 acres of land in Chintalavalasa village situated in the outskirts of Vizianagaram, a fort city in the north coastal region of Andhra Pradesh.

MVGR College of Engineering

- Established in the year 1997
- Reaccredited for all B.Tech Programs (CHEMICAL, CSE, ECE, EEE, IT, CIVIL& MECHANICAL) by National Board of Accreditation
- Departments of MECHANICAL, CHEMICAL, ECE and CSE are recognized as RESEARCH CENTERS by JNTUK
- MBA program was accredited by NBA and presently in the progress of reaccreditation
- Reaccredited with 'A' grade by National Assessment and Accreditation Council up to 2020
- Conferred "Autonomous Status" up to 2020-21 by UGC
- Permanently affiliated to JN Technological University-Kakinada
- Listed under sections of 2(f) & 12(b) of UGC act 1956.
- Approved by AICTE-New Delhi
- MSME identified "Business Incubation Centre"
- Government of AP identified the institution as "Skill Development Centre"
- MVGR College of Engineering is rated as one among the best EngineeringInstitutions in the state of Andhra Pradesh.
- Identified as Technical Skill Development Institute by SIEMENS

MVGR College of Engineering is rated as one among the best engineering colleges in the state of Andhra Pradesh as it set up highest standards in all areas of curricular, co-curricular and extra-curricular activities and in students' placements. Based on industry and expert's feedback, the college is updating the curriculum from time to time. The college offers many value added add-on courses for students and conducts training programs to meet the industries' requirements.

Academic Regulations for B.Tech. Program

Applicable to the students admitted from the Academic year 2015-2016 onwards.

1. COURSE PATTERN:

B.Tech. : The program is 8 Semesters over 4 academic years.

B.Tech. (Lateral Entry): The program is 6 Semesters over 3 academic years.

2. AWARD OF DEGREE:

A student will be declared eligible for the award of degree on fulfilling the following academic regulations:

a) Shall complete program course work within 8 years (6 years in case of lateral entry admission) from the year of admission else shall forfeit admission.

b) Shall register for 180 credits (138 in case of lateral entry admission)and secure all.

c) Shall also register and successfully complete audit programs (Non-credit) offered by the Program Department.

d) On completing one year of class work, mayopt for a break of 1 year which shall be deemed as GAP year, as recommended by APSCHE, for undertaking successful entrepreneurial ventures.

3. CERTIFICATION PROGRAMME:

The following certification programs are being offered:

S.No.	Department	Name of the Program
1	MECH	Windchill 10.2 PDM by Adroitec Engineering Solutions Pvt. Ltd., Hyderabad
2	MECH	Creo 2.0 by PTC
3	MECH	Edgecam by Verosoft, UK
4	CHEM	Chemical Process Design and Simulation by Simtech Simulations, Hyderabad
5	ECE	Embedded Systems by ThinkLABS, Mumbai
6	ECE	Labview by National Instruments Systems India Pvt. Ltd.
7	ECE	Unified Technology Learning Program (UTLP) by Wipro Mission 10X
8	CSE, IT	PEGA by Virtusa Corporation
9	CSE, IT	Microsoft technologies by Microsoft Corp.
10	CSE, IT	Ethical Hacking by EC-Council Academia
11	CSE, IT	Java and C by Talent Sprint
12	CSE, IT	Network Analyst (CCNA) by Cisco Systems Inc
13	CSE, IT	Java Programming (OCJP) and DBMS by Oracle
14	EEE	PLC, Drives and Automation by Siemens
15	EEE	PLC by New Dawn Automation
16	Civil	Remote Sensing and GIS by Indian Institute of Remote Sensing

a) Certification Programs other than mentioned may also be offered with advance notice from time to time.

b) The Institution shall offer the certification programs by itself or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

c) Only students of the Institution shall be eligible to register on payment of prescribed fee.However, subject to availability of resources and the demand the Institution may offer the program to external candidates meeting the pre-qualification requirements and in the order of the merit.

d) The duration of the course and design of the content shall be done by the respective departments of the Institution by themselves or in collaboration with industry/such other Institutions deemed to have specialized expertise in the proposed area of training.

e) The duration under normal condition shall not exceed 50 hours per semester else it can suitably be distributed over a number of semesters.

f) Mere enrolment/registration for the program shall not entitle any claim for award of certificate.

g) A candidate shall be deemed eligible for the award of the certificate subject to:

- Attending at least 75% of scheduled training sessions
- Compliance to all the requirements of submission of the assignments, presentations, seminars, projects, etc., and also appears for periodic tests
- Attaining minimum levels of performance as prescribed by the departments successfully
- Payment of such fee as deemed fit for the certification

h) A candidate registered and failed to meet the requirements shall be permitted to repeat the said training one another time after remitting 25% of the fee fixed for the program as re-registration fee

4. COURSES OFFERED:

Name of the Program	Degree
B.Tech. UG Programs (Engineering & Technology)	• Civil Engineering • Electrical and Electronics Engineering • Mechanical Engineering • Electronics and Communication Engineering • Computer Science and Engineering • Chemical Engineering • Information Technology
M.Tech. PG Programs (Engineering & Technology)	• Structural Engineering • Power Systems • Product Design and Manufacturing • VLSI • Communication Systems • Computer Networks and Information Security • Data Sciences
Other PGPrograms	MBA
Ph. D.(Research Programs)	CIVIL ,EEE,MECH, ECE, CSE, CHEM , IT,MBA,Maths.

5. DISTRIBUTION AND WEIGHTAGE OF MARKS:

B.TECH:

a). Theory courses are assessed for 100 marks with a split of 40 marks for internal assessment and 60 marks for semester end external examination.

- Two internal assessments tests (90 min each), for each theory course are conducted over the period of the semester, one in the middle and the other at the end and the performances are averaged for 30 marks.
- Internal assessment test shall have 3 questions each for 10 marks, all questions to be answered.
- Shall also be assessed for two assignments/surprise test/quiz or a combination each for 5 marks and for a total of 10 marks.
- External examination is for 60 marks (180 min). Question paper contains 7 questions at least 1 question from each unit. Each question carries 12 marks. A student is expected to answer any 5 questions.

b). **Laboratory/Practice:**

Laboratory/Practice courses are assessed for 100 marks with a split of 40 marks for internal assessment and 60 marks for semester end external examination.

- Continuous assessment for 20 marks for each experimental session finally averaged to 20 marks.
- Internal assessment test (180 min) conducted at the end of the semester shall be assessed for another 20 marks where a student is expected to perform at least one laboratory test/experiment. Appropriate weightage shall be given to the performance in viva-voce.
- External examination is for 60 marks (180 min) - conducted and assessed by an external and internal examiners.
- Both internal and external examination shall include assessment of the student on
    a) Knowledge of principles/concepts involved
    b) Experimental design
    c) Result interpretation and analysis
    d) Experimental report

c). **Drawing/Design/Estimation:**

These courses are assessed for 100 marks with a split of 40 marks for internal assessment and 60 marks for semester end external examination.

- Continuous assessment is for 20 marks for each session / unit finally averaged to 20 marks.
- Two internal assessment tests are conducted during the semester and assessed for the remaining 20 marks by taking the average.

d) **Project Evaluation**:

- A student shall take a project during the eighth semester.
- Project is evaluated for 200 marks.
- A student shall report to the guide/external supervisor and work under his supervision at least 10 hours per week.
- Also, a student shall engage a minimum of 10 hours per week in the directed study/learning a modern tool/self-learning (referencing etc.,)/periodic report writing/conduct of experiments/tests/fabrication together.
- Evaluation shall comprise of internal and external assessment.

  Internal: 80

  External: 120

- A project committee comprising of HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide shall review the progress once in four weeks.
- Vice-Principal (Academic) / one of the ADMN team members shall be an invitee for the review.
- Internal evaluation shall be done by HoD, department Academic Coordinator, R&D member of the department, one senior faculty and guide for 80 marks.
- External evaluation shall be done by HoD, Guide/Internal Examiner and External Examiner for 120 marks.
- Assessment shall be on:

  a) Problem definition

  b) Literature review

  c) Review on fundamental knowledge involved

  d) Inter disciplinary aspect

  e) Experimental/methodology design

  f) Result analysis and interpretations

  g) Report writing

  h) Team work

  i) Presentation

  j) Viva-voce

6. ATTENDANCE REGULATIONS:

I. A student shall be eligible to appear for end semester examinations, if aminimum of 75% of attendance in aggregate of all the subjects (Theory & Lab.) for the semester is secured.

II. A Student shall be promoted to the next semester on fulfillment of a minimum of 75% attendance in the current semester.

III. A student detained may seek re- admission for that semester when offered.

IV. To appear for end laboratory examination a candidate shall put up a minimum of 75% attendance for regular lab sessions and should have completed all the laboratory experiments/tests along with submission of record complete in all respects.

7. MINIMUM ACADEMIC REQUIREMENTS:

i. A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted and secures at least 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks both internal and semester end examinationsput together.

ii. A student shall be promoted from IV semester to V semester if he fulfills the academic requirement of 50% of credits up to IV semester from the following examinations irrespective of whether the candidate takes the examination or not.

a) Two regular and Two supplementary examinations of I semester
b) Two regular and One supplementary examinations of II semester
c) One regular examination and One supplementary examination of III semester
d) One regular examination of IV semester.

iii. A student shall be promoted from VI semester to VII semester subject to fulfillment of the academic requirement of 50% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not.

a) Three regular and Three supplementary examinations of I semester
b) Three regular and Two supplementary examinations of II semester
c) Two regular and Two supplementary examinations of III semester
d) Two regular and One supplementary examinations of IV semester
e) One regular and One supplementary examination of V semester
f) One regular examination of VI semester.

B.TECH (Lateral Entry):

i) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted and secures at least 24 marks out of 60 marks at semester end examination and overall 40 marks out of 100 marks both internal and semester end examinations put together.

ii) A student shall be promoted from VI semester to VII semester if he fulfills the academicrequirement of 50% of credits up to VI semester from the following examinations irrespective of whether the candidate takes the examination or not replace with:

a) Two regular and Two supplementary examinations of III semester
b) Two regular and one supplementary examinations of IV semester
c) One regular and One supplementary examinations of V semester
d) One regular examination of VI semester.

8. PROGRAM STRUCTURE:

The total program will consist of the following components.

a) Foundation Mandatory	FM	39-45 credits

- Basic Science Core(BSC)
- Engineering Science Core(ESC)
- Mandatory Learning Core(MLC)
- English & Humanities Core(EHC)

b) Foundation Elective	FE	06-09 credits
c) Core Mandatory(Theory)	CM	68-76 credits
d) Core Mandatory(Lab)	CM(L)	18-22 credits
e) Core Elective (Theory)	CE(T)	21-27 credits
f) Open Elective	OE	06-09 credits
g) Directed Study	DS	02-04 credits
h) Project	PR	08-12 credits
i) Audit Courses	AC	S/N

- Open electives offered by the parent department are listed in the course structure and are offered to students of other programs also.
- For audit course a student is expected to meet minimum contact hours, as prescribed by the department and shall also comply with the requirements of submission of assignments/projects.

List of Foundation Electives:

1. Professional Communication
2. Business Communication
3. Material Science
4. Engineering Mathematics-II
5. Electro Magnetic Theory
6. Instrumental Methods of Analysis
7. Thermodynamics
8. Applied Analysis
9. Probability & Statistics
10. Complex variables & Statistical Methods

List of Audit Courses:

1. Professional Ethics & IPR
2. Soft Skills-I
3. Soft Skills-II
4. General Aptitude
5. NSS/NCC/Sports/Cultural/Yoga
6. Health and Nutrition
7. Entrepreneurship Development
8. Foreign Language (Chinese/Japanese/Korean/German/French)

*For all the programs offered, in the list of courses for electives one of the choices would be "MOOCs". Each department shall short list MOOCs course/(s) meeting the requirements of course duration, credits, etc., from time to time. The same shall be placed in the immediate BoS meeting for ratification.

9. GRADING SYSTEM:

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

Semester Grade Point Average (SGPA) is calculated on the basis of grade points obtained in all courses, except audit courses and courses in which satisfactory or course continuation has been awarded.

The **SGPA** is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$\mathbf{SGPA\ (Si) = \Sigma(Ci \times Gi) / \Sigma Ci}$$

Where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

The **CGPA** is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\mathbf{CGPA = \Sigma(Ci \times Si) / \Sigma Ci}$$

Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

The UGC recommends a 10-point grading system with the following letter grades as given below:

O	(Outstanding)	10
A+	(Excellent)	9
A	(Very Good)	8
B+	(Good)	7
B	(Above Average)	6
C	(Average)	5
P	(Pass)	4
F	(Fail)	0
Ab	(Absent)	0

- A student with Grade F is required to reappear for the examination.

Illustration for Computation of SGPA

Course	Credit	Grade Letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10= 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
20				**139**

Thus, **SGPA** =139/20 = 6.95

Illustration for Computation of CGPA

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**	**Semester 5**	**Semester 6**
Credit : 20	Credit : 22	Credit : 25	Credit : 26	Credit : 26	Credit : 25
SGPA:6.9	SGPA: 7.8	SGPA: 5.6	SGPA: 6.0	SGPA: 6.3	SGPA: 8.0

Semester 7	**Semester 8**
Credits: 23	Credits:13
SGPA: 8.2	SGPA: 8.5

Thus, **CGPA** = 20 x 6.9 + 22 x 7.8 + 25 x 5.6 + 26 x 6.0 + 26 x 6.3 + 25 x 8.0+23x8.2+13x8.5

_____ **= 7.05**

180

10. ELIGIBILITY FOR AWARD OF DEGREE:

A student shall be eligible for award of the degree if he/she fulfillsthe following conditions:

1) Successfully completes all the courses prescribed for the Program.
2) CGPA greater than or equal to 4.0(Minimum requirementfor Pass),
3) Should have cleared all dues.
4) Complied with all the rules and regulations during the period of study governing satisfactory conduct.

11. AWARD OF CLASS:

Candidates who are eligible for the award of B.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Class	**CGPA**
Distinction	≥ 7.5
First Class	≥ 6.5
Second Class	≥ 5.5
Pass class	≥ 4.0

12. INSTRUCTION DAYS: A semester shall have a minimum of 90 clear instruction days.

13. There shall be no **branch transfer** after completion of the admission process.

14. SUPPLEMENTARY EXAMINATIONS:

Supplementary examinations shall be conducted in addition to regular examinations for every semester.

15. WITHHOLDING OF RESULTS: The result of the student will be withheld

- If any pending case of disciplinary action against him,
- Involving in any sort of malpractices etc.

16. TRANSITORY REGULATIONS:

- A candidate joining the Institution on transfer from other Institutions shall submit a record/history of courses of semesters already completed elsewhere prior to seeking such transfer.
- Board of Studies of the department may accept/reject such request for transfer depending on compatibility of the program.
- For accepted cases, the Board of Studies shall recommend equivalency of courses and also additional equivalent (substitute) courses if any to be taken up for the award of degree for all prospective courses leading to the completion of the program.
- Only candidates who have fulfilled the academic/course work requirements up to the previous semester shall be considered for admission on transfer.
- Student seeking admission on transfer should have cleared backlogsubjects of previous semestersat the parent college.
- Admission on transfer may be taken only on the payment of prescribed fee prevailing at the time.

17. AMENDMENTS TO REGULATIONS:

The Academic Council of MVGR College of Engineering (Autonomous) reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations, and/ or Syllabi or any other such matter relating to the requirements of the program which are compatible to the contemporary/emerging trends effectively meeting the needs ofsociety/industry/stake holding groups.

18. List of MALPRACTICES and corresponding punishments

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the candidate possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.

(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled.
3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider/candidate not on rolls, he will be handed over to the police and a case is registered against him.
4	If the candidate mishandles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination. Also if the answer script is mutilated / damaged disturbing the shape, of the script, answers, the bar code intentionally.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. He shall be

		debarred from class work and all examinations and be allowed to reregistered for the next subsequent odd or even semester only. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	The same should be brought to the notice of CE who in turn in consultation with malpractice committee makes decision for cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is

		subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.

Ragging

Prohibition of ragging in Educational Institutions Act 26 of 1997

Salient Features

- Ragging within or outside any Educational Institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto		Find Upto
Teasing, Embarrassing and Humiliation	6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE MVGR A RAGGING FREE CAMPUS

ABSOLUTELY NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

COURSE STRUCTURE
B.TECH (CIVIL ENGINEERING)

SEMESTER - I						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1MAT001	Engineering Mathematics – I	3	1	-	3
2	A1PYT001	Engineering Physics	3	-	-	3
3	A1CHT001	Environmental Studies	3	-	-	3
4	A1MED001	Engineering Drawing	1	-	3	3
5	A1CIT001	Computer Programming	3	1	-	3
6	A1EHL001	English Language Practice – I	1	-	2	2
7	A1PYL001	Engineering Physics Laboratory	-	-	3	2
8	A1CIL001	Computer Programming Laboratory	-	-	3	2
Total Number of Credits						**21**

SEMESTER - II						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1MAT002	Mathematical Methods	3	1	-	3
2	A1CYT001	Engineering Chemistry	3	-	-	3
3	A1EET001	Basic Electrical and Electronics Engineering	3	1	-	3
4	A1CET002	Applied Mechanics	3	1	-	3
5	A1XXT1XX	**Foundation Elective I**	3	1	-	3
6	A1EHL002	English Language Practice – II	1	-	2	2
7	A1CYL001	Engineering Chemistry Laboratory	-	-	3	2
8	A1MEW001	Basic Engineering Workshop	-	-	3	2
Total Number of Credits						**21**

SEMESTER - III						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1CET201	Strength of Materials-I	3	1	-	4
2	A1CET202	Elements of Surveying	3	1	-	4
3	A1CET203	Fluid Mechanics	3	1	-	4
4	A1CET204	Building Materials and Concrete Technology	3	1	-	4
5	A1MST001	Managerial Economics & Financial Analysis	3	-	-	3
6	A1XXT1XX	**Foundation Elective II**	3	-	-	3
7	A1CEL201	Surveying Laboratory	-	-	3	2
8	A1CEL202	Fluid Mechanics Laboratory	-	-	3	2
9	A1ACA5XX	**Audit Course 1**				
Total Number of Credits						**26**

SEMESTER - IV						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1CET205	Strength of Materials-II	3	1	-	4
2	A1CET206	Hydraulics and Hydraulic Machinery	3	1	-	4
3	A1CET207	Structural Analysis	3	1	-	4
4	A1CED208	Building Planning & Civil Engineering Drawing	1	-	3	4
5	A1CET3XX	**Core Elective I**	3	-	-	3
6	A1CEL203	Strength of Materials Laboratory	-	-	3	2
7	A1CEL204	Hydraulic Machinery Laboratory	-	-	3	2
8	A1ACA5XX	**Audit Course 2**				
Total Number of Credits						**23**

SEMESTER - V						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1CET209	Water Resources Engineering	3	1	-	4
2	A1CET210	Design of Reinforced Concrete Structures	3	1	-	4
3	A1CET211	Transportation Engineering	3	1	-	4
4	A1CET212	Geotechnical Engineering	3	1	-	4
5	A1CET213	Environmental Engineering I	3	1	-	4
6	AICET4XX	**Open Elective I**	3	-	-	3
7	A1CEL205	Concrete Technology Laboratory	-	-	3	2
8	A1CEL206	Engineering Geology Laboratory	-	-	3	2
9	A1ACA5XX	**Audit Course 3**				
Total Number of Credits						**27**

SEMESTER - VI						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1CET214	Design of Steel Structures	3	1	-	4
2	A1CET215	Advanced Reinforced Concrete Structures	3	1	-	4
3	A1CET216	Foundation Engineering	3	1	-	4
4	A1CET217	Environmental Engineering II	3	1	-	4
5	A1CET3xx	**Core Elective II**	3	-	-	3
6	A1CET4xx	**Open Elective II**	3	-	-	3
7	A1CEL207	Transportation Engineering Laboratory	-	-	3	2
8	A1CEL208	Geotechnical Engineering Laboratory	-	-	3	2
9	A1ACA5XX	**Audit Course 4**				
10	A1ACA5XX	**Audit Course 5**				
Total Number of Credits						**26**

SEMESTER - VII						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1CET218	Estimation and Contracts	3	1	-	4
2	A1CET3xx	**Core Elective III**	3	-	-	3
3	A1CET3xx	**Core Elective IV**	3	-	-	3
4	A1CET3xx	**Core Elective V**	3	-	-	3
5	A1CET3xx	**Core Elective VI**	3	-	-	3
6	A1CET3xx	**Core Elective VII**	3	-	-	3
7	A1CET3xx	**Core Elective VIII (Self Study)**	3	-	-	3
7	A1CEL209	GIS & CAD LAB	-	-	3	2
8	A1CEL210	Environmental Engineering Lab	-	-	3	2
9	A1ACA5XX	**Audit Course 6**				
Total Number of Credits						**26**

SEMESTER - VIII						
S. No	Subject Code	Subject	L	T	P	Credits
1	A1CEP601	Directed Study				2
2	A1CEP602	Project Work				8
Total Number of Credits						**10**

Foundation Elective – I & II						
S. No	Subject Code	Subject	L	T	P	C
1	A1EHT101	Professional Communication	3	-	-	3
2	A1EHT102	Business Communication	3	-	-	3
3	A1MET103	Material Science	3	-	-	3
4	A1MAT104	Engineering Mathematics II	3	-	-	3
5	A1PYT105	Electro Magnetic Theory	3	-	-	3
6	A1CYT106	Instrumental Methods of Analysis	3	-	-	3
7	A1MET107	Thermodynamics	3	-	-	3
8	A1CYT108	Applied Analysis	3	-	-	3
9	A1MAT109	Probability and Statistics	3	-	-	3
10	A1MAT110	Complex Variables & Statistical Methods	3	-	-	3

CORE ELECTIVES						
E. No	Course Code	Subject	L	T	P	C
CE 1	A1CET301	Advanced Surveying	3	-	-	3
	A1CET302	Advanced Concrete Technology	3	-	-	3
	A1CET303	Engineering Geology	3	-	-	3
CE 2	A1CET304	Advanced Structural Analysis	3	-	-	3
	A1CET305	Repair and Rehabilitation of Structures	3	-	-	3
	A1CET306	Construction Equipment and Methods	3	-	-	3
CE 3	A1CET307	Railways, Harbours and Airports	3	-	-	3
	A1CET308	Advanced Water Resources Engineering	3	-	-	3
	A1CET309	Structural Dynamics	3	-	-	3
CE 4	A1CET310	Earthquake Resistant Design of Structures	3	-	-	3
	A1CET311	Pavement Analysis, Design and Evaluation	3	-	-	3
	A1CET312	Building Construction & Services	3	-	-	3
CE 5	A1CET313	Ground Improvement Techniques	3	-	-	3
	A1CET314	Introduction to Finite Element Methods	3	-	-	3
	A1CET315	Project Planning and Management	3	-	-	3
CE 6	A1CET316	Urban Transport Planning	3	-	-	3
	A1CET317	Advanced Structural Design	3	-	-	3
	A1CET318	Hydro Power Engineering	3	-	-	3
CE 7	A1CET319	Design and Drawing of Irrigation Structures	3	-	-	3
	A1CET320	Environmental Impact Assessment and Management	3	-	-	3
	A1CET321	Remote Sensing and GIS	3	-	-	3
CE 8	A1CET322	Rural Roads	3	-	-	3
	A1CET323	Solid Waste Management	3	-	-	3
	A1CET324	MOOCs courses	3	-	-	3

Open Electives offered to other departments						
S. No	Subject Code	Subject	L	T	P	C
1	A1CET401	Project Planning and Management	3	-	-	3
2	A1CET402	Air Pollution and Control	3	-	-	3
3	A1CET403	Road Safety Engineering	3	-	-	3
4	A1CET404	Traffic Engineering	3	-	-	3
5	A1CET405	Disaster Management	3	-	-	3
6	A1CET406	Applications of RS & GIS	3	-	-	3

Audit Courses

Audit Course Electives		
S. No	Subject Code	Subject Name
1	A1ACA501	NSS
2	A1ACA502	NCC
3	A1ACA503	Sports
4	A1ACA504	Cultural
5	A1ACA505	Yoga
6	A1ACA506	Health & Nutrition
7	A1ACA507	Entrepreneurship Development
8	A1ACA508	Foreign Language (Chinese/Japanese/Korean/German)
9	A1ACA509	Professional Ethics & IPR
10	A1ACA510	Soft Skills – I
11	A1ACA511	Soft Skills – II
12	A1ACA512	General Aptitude
13		MOOCs

A1MAT001	SEMESTER - I	L	T	P	C
	ENGINEERING MATHEMATICS-I	3	1*	-	3
	Total Contact Hours – 45				
COURSE OBJECTIVES					
COBJ1	To develop the proficiency in solving 1st order & 1st degree differential equations and linear differential equations of second and higher order with constant coefficients.				
COBJ2.	To learn the definition and scope of Laplace Transforms and to learn the method of solving initial value problems.				
COBJ3.	To learn the concept of Maxima and Minima of functions of several variables.				
COBJ4.	To learn the method of formation and solving of PDE's of particular types of linear and non-linear.				

SYLLABUS

UNIT – I: DIFFERENTIAL EQUATIONS OF FIRST ORDER
Linear equations – Bernoulli equations – Exact equations

APPLICATIONS OF DIFFERENTIAL EQUATIONS OF FIRST ORDER:
Newton's Law of cooling – rate of decay of radioactive materials - orthogonal trajectories.

UNIT – II: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS:
Linear differential equations-definition-operator form-rules for finding complimentaryfunction - rules for finding particular integral-working procedure to solve the equations.

UNIT-III: LAPLACE TRANSFORMS:
Introduction-definition-transforms of elementary functions- properties of laplace transforms-transforms of derivatives-transforms of integrals-multiplication by t^n-division (statements only)

INVERSE TRANSFORMS–method of partial fractions- Convolution theorem (without proof)-applications to differential equations.

UNIT-IV: PARTIAL DIFFERENTIATION AND ITS APPLICATIONS:
Functions of two or more variables-total derivative-differentiation of implicit function-change of variables-Jacobians.Maxima and Minima of functions of two variables-Lagrange's method of undetermined multipliers.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS:
Introduction-Formation of partial differential equations-linear equations of first order-non linear equations of first order (standard types).

UNIT – VI: HIGHER ORDER PARTIAL DIFFERENTIAL EQUATIONS:
Homogeneous linear partial differential equations with constant coefficients- rules for finding complimentary function – rules for finding particular integral-working procedure to solve the equations.

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS: Method of separation of variables- vibrations of stretched string – wave equation-One-dimensional heat flow equation, solution of Laplace equation (problems only).

TEXT BOOK:

1. B.S.GREWAL, Higher Engineering Mathematics, 42nd Edition, Khanna publishers

REFERENCES:

1. ERWIN KRESZIG, Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. GREENBERG, Advanced Engineering Mathematics, 2nd edition, Pearson education

COURSE OUTCOMES:

CO1. Students will be able to apply the knowledge of solving 1st order & 1st degreedifferential equations in finding orthogonal trajectories of families of curves, Growth & Decay problems.

CO2. Student will be able to find the solution of initial value problems and be able to evaluate improper integrals of particular kind by using Laplace Transforms.

CO3. Students will be able to apply the concepts of Maxima and Minima for finding extreme values.

CO4. Student will be able to formulate and solve P.D.E and be able to apply the knowledge in finding the solutions of one dimensional wave equation and one dimensional heat equation.

A1MAT001- ENGINEERING MATHEMATICS-I											
Course designed by	DEPARTMENT OFMATHEMATICS										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	X				X						X

A1MAT001- ENGINEERING MATHEMATICS-I	
Course designed by	DEPARTMENT OFMATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1PYT001	SEMESTER - I	L	T	P	C
	ENGINEERING PHYSICS	3	0	0	3
	Total Contact Hours – 44				
	Prerequisite : None				
COURSE OBJECTIVES					
COBJ 1.	To learn different optical phenomena shown by light waves related to interference and diffraction and characteristics of coherent radiations with an example and their application in specific to optic fiber.				
COBJ 2.	To gain knowledge on the foundation principles of crystallography in specific to crystal systems, unit cell and related parameters and to understand about concept of X-ray diffraction.				
COBJ 3.	To gain knowledge on the magnetic and dielectric properties of materials.				
COBJ 4.	To gain knowledge on the fundamental laws of thermodynamics and entropy and its physical significance				
COBJ 5.	To gain knowledge on the different forced systems and their resultant and the concepts of friction.				

SYLLABUS

UNIT-1 WAVE OPTICS

[08hrs]Introduction- Coherent sources- Interference in thin parallel film by reflection- Newton's rings- Fraunhofer diffraction due to single slit – Diffraction grating (Qualitative)- Resolving power of grating- Rayleigh criterion for resolving power- Polarization- Double refraction- Half wave plate –Quarter wave plate.

UNIT-2 LASER AND FIBER OPTICS [06hrs]

LASER: Introduction- Characteristics of lasers- Absorption, Spontaneous and stimulated emission of radiation - Population inversion- Semiconductor laser.

Fiber Optics: Introduction- Principle of optical fiber- Acceptance angle- Acceptance cone- Numerical Aperture.

UNIT-3 CRYSTALLOGRAPHY [06hrs]

Introduction- space lattice- basis- unit cell- lattice parameters- Crystal systems- Bravais lattices- Packing fractions of simple, body centered, face centered cubic structures - Directions and Planes in crystals- Miller indices- Interplanar spacing- Bragg's Law of X-Ray diffraction.

UNIT-4 MAGNETIC AND DIELECTRIC PROPERTIES OF MATERIALS [08hrs]

Magnetic Properties: Introduction- Origin of magnetic moment and Bohr magneton- Classification of magnetic materials- Hysteresis- Soft and hard magnetic materials.

Dielectrics: Introduction- Dielectric constant- Electronic, ionic and orientation polarization mechanisms (qualitative) - Internal field- Clausius-Mossotti relation.

UNIT-5 THERMODYNAMICS [06hrs]

Introduction- Zeroth law of thermodynamics- Internal energy- Work done in Isothermal and Adiabatic process- First law of thermodynamics- Reversible and Irreversible process- Second law of thermodynamics- Thermodynamical scale of temperature- Entropy- Physical significance- Temperature entropy diagram.

UNIT-6 PRINCIPLES OF MECHANICS **[10hrs]**

Introduction- System of forces- Resultant of coplanar concurrent & coplanar non-concurrent forces- Force system in space- Friction- Basic definition- Limiting friction & Impending motion- Coulomb's laws of dry friction- Coefficient of friction- Cone of friction- Types of friction (qualitative).

TEXT BOOKS

1. Engineering Physics by Gaur and Gupta, DhanpathraiPublications

REFERENCES

1. University Physics by Sear's and Zemansky, Pearson Edition.
2. Fundamentals of Physics by Resnick, Halliday&Walker

S.NO.	COURSE OUTCOMES
CO 1.	Student will be able to understand the phenomena of interference, diffraction and polarization exhibited by light waves and the characteristics of lasers with an example and its application in specific to optic fiber.
CO 2.	The student shall understand about different crystal systems, space lattices, and parameters of unit cell and the Bragg's law of X-ray diffraction.
CO 3.	Student shall understand about response of the materials in presence of electric and magnetic fields.
CO 4.	Student will gain knowledge on the basic laws of thermodynamics, work done, thermodynamic processes and entropy.
CO 5.	Student will be able to understand thesystem of forces(non-equilibrium)and different types frictions.

A1PYT001- ENGINEERING PHYSICS											
Course designed by	DEPARTMENT OF PHYSICS										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	√	√		√							

A1PYT001- ENGINEERING PHYSICS	
Course designed by	DEPARTMENT OF PHYSICS
Approval	Approved by: Meeting of Board of Studies held on 23rd June, 2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1CIT001	SEMESTER - I	L	T	P	C
	COMPUTER PROGRAMMING	3	1*	-	3
	Total Contact Hours – 42				
	Prerequisite : None				
COURSE OBJECTIVES					
COBJ1.	Students will study systematic approach to problem solution specification using finite number of unambiguous steps.				
COBJ2.	Students will gain understanding of procedural language features using C as the template.				
COBJ3.	Students will read and analyze alternative construct choices in procedural language C.				
COBJ4.	Students will get exposure to `systematic approach of automated solution design, implementation and testing using a procedural language.				

SYLLABUS

UNIT – I

Introduction: Computer System, Hardware and Software concepts.

Problem Solving: Algorithm, Pseudo-code, flow-chart, program development steps, high-level, Assembly and machine languages, Creating and running programs.

Basics of C: Structure of C program, identifier, basic data types and sizes, constants, variables, arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, conditional operator, expressions, type conversions, conditional expressions, precedence and order of evaluation.

UNIT – II

Selection: Two way selection: if-else, null else, nested if, examples, multi-way selection: switch, else-f, examples.

Iterative: loops: while, do-while and for statements, break continue, event and counter controlled loops.

Looping Applications: Summation, powers, smallest, and largest

Arrays: Concepts, declaration, definition, accessing elements, storing elements, String and String manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multi-dimensional arrays, Matrix operations, checking the symmetries of a Matrix examples.

Strings: concept, c strings.

UNIT – III

FUNCTIONS- MODULAR PROGRAMMING: Functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT – IV

POINTERS: Pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments.

UNIT – V

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures-declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, type definition, bit-fields, program applications.

BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT – VI

FILEHANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example program.

Text Books:

1. Introduction to C Programming, ReemaThareja, OXFORD
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

Reference Books:

1. The C programming Language by Dennis Richie and Brian Kernighan
2. Programming in C, PradipDey, ManasGhosh, Oxford Higher Education.

COURSE OUTCOMES

CO1 Have the ability to write a formal algorithmic solution for the given problem & explain the features of C like types including scalar & vector types, operators, expressions, expression evaluation, operator precedence, sequential, conditional & iterative constructs.

CO2 Have the ability to use modular programming constructs of C while appreciating different ways of exchanging inputs and outputs among modules and different memory allocation strategies in C.

CO3 Have the ability to define & use user defined data types using C constructs and write C programs that handles files.

CO4 Grasp the significance of primary constructs & methodology of procedural language C and appreciate the orthoganality of the same in writing reasonably complicated programs.

CO5 Grasp the significance of type extendibility in C, need for address as a data type and library functions for dealing with files in writing more complicated programs.

CO6 Fully appreciate the art of procedural programming in C and develop programs optimally using the full feature set of C language.

< A1CIT001><COMPUTER PROGRAMMING>													
Course designed by		< COMPUTER SCIENCE & ENGINEERING>											
1	Course/Program outcomes mapping	a	b	c	d	e	f	g	h	i	j	k	l
		√	√		√			√		√			√
2	Approval	Approved by: Meeting of Board of Studies held on 17th June, 2015											
		Ratified by: 1st Meeting of Academic Council, 27th June, 2015											

A1MED001	SEMESTER - I	L	T	P	C
	ENGINEERING DRAWING	1	0	3	3
	Total Contact Hours – 52				
	Prerequisite : NA				
COURSE OBJECTIVES					
1.	TO ENABLE THE STUDENT ACQUIRE GRAPHICAL PRESENTATIONAL SKILLS TO PRESENT A DESIGN				
2.	TO ENABLE THE STUDENT ACQUIRE REQUIRED SKILLS TO PRODUCE STANDARD DRAWINGS RELATED TO A FIELD OF ENGINEERING				
3.	TO ENABLE THE STUDENT DEVELOP GEOMETRICAL MODELS REQUIRED FOR COMPUTER AIDED ENGINEERING				

Syllabus

Unit I **Total=12 hrs**

Polygons-Construction of Regular Polygons using given length of a side; Conic Curves (Ellipse, Parabola and Hyperbola) and Plain Scale.

Unit II **Total=08 hrs**

Introduction to Orthographic Projections; Projections of Points; Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane.

Unit III **Total=08 hrs**

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

Unit IV **Total=08 hrs**

Projections of Planes; Regular Planes Perpendicular / Parallel to one Reference Plane and inclined to other Reference Plane; inclined to both the Reference Planes.

Unit V **Total=08 hrs**

Projections of Solids-Prisms and Cylinders with the axis inclined to one Plane.
Projections of Solids- Pyramids and Cones with the axis inclined to one plane.

Unit VI **Total=08 hrs**

Conversion of Isometric Views to Orthographic Views.
Conversion of Orthographic Views to Isometric Projections and Views.

TEXT BOOK:

Engineering Drawing by N.D. Bhatt, Charotar Publications

REFERENCE BOOKS:

1. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers
2. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers
3. Engineering Graphics for Degree by K.C. John, PHI Publishers

OUTCOMES:

i. Student will be able to construct regular polygons, conic curves and simple scales.

ii. Student will be able to draw orthographic projections of points, lines, planes and solids.

iii. Student will be able to produce isometric projection from orthographic projections and vice-versa.

A1MED001ENGINEERING DRAWING												
Course designed by	Department of Mechanical Engineering											
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k	l

A1MED001 ENGINEERING DRAWING	
Course designed by	Department of Mechanical Engineering
Approval	Approved by: Meeting of Board of Studies held on 17th June, 2015
	Ratified by: 1st Meeting of Academic Council, 27thJune, 2015

A1CHT001	SEMESTER - I	L	T	P	C
	ENVIRONMENTAL STUDIES	3	0	0	3
	Total Contact Hours – 45				
	Prerequisite : Nil				
COURSE OBJECTIVES					
1.	To impart overall understanding of natural resources				
2.	To impart basic understanding of the ecosystem and its diversity				
3.	To impart acquaintance on various environmental challenges induces due to unplanned anthropogenic activities				
4.	To impart an understanding of the environmental impact of developmental activities				
5.	To impart awareness on the social issues, environmental legislation and global treaties				

SYLLABUS

UNIT – I:

Multidisciplinary nature of Environmental Studies:

Definition, Scope and Importance and of Multidisciplinary nature of Environmental Studies, Stockholm and Rio-Summit, Climate change: Global warming, Acid rains, Ozone layer depletion, Population growth and explosion, Role of information technology in environment and human health.

UNIT – II:

Natural resources:

Natural resources and associated problems, Forest resources – Use and over utilization – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water –Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

UNIT – III:

Ecosystem

Concept of an ecosystem**,** Definition, Classification, structure of an Ecosystem: Producers, consumers and decomposers, Function of an ecosystem: Food chains, food webs and ecological pyramids, Energy flow in the ecosystem, Nutrient cycles, Ecological succession, Introduction, types, characteristic features, structure and function of the following ecosystems: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems.

Biodiversity and its conservation:
Definition and types: genetic, species and ecosystem diversity, Values of biodiversity
Bio-geographical classification of India, Biodiversity at global, National and local levels, India as a mega-diversity nation.
Hot-spots of biodiversity and threats to biodiversity
Endangered and endemic species of India
Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – IV:
Environmental Pollution
Definition, Cause, effets and control masures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Nuclear hazards.Role of an individual in prevention of pollution.

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes, Consumerism and waste products.

UNIT – V:
Social Issues and Environment
Urban problems related to energy, Water conservation, rain water harvesting and watershed management. Resettlement and rehabilitation of people; its problems and concerns, Environmental ethics: Issues and possible solutions.
Environment Protection Acts: Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act -Forest Conservation Act, Issues involved in enforcement of environmental legislation. Public awareness.

UNIT – VI:
Environmental Management
Impact Assessment and its significance, various stages of EIA
Preparation of EMP and EIS, Environmental audit and Ecotourism

Student reports and PPT presentations individually on any issues related to Environmental Studies course

TEXT BOOKS
1. Environmental Studies by Anubha Kaushik, 4th Edition
2. A Textbook of Environmental Studies by ShashiChawla, TMH, New Delhi

REFERENCE BOOKS
1. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai
2. Text Book of Environmental Studies by Deeshita Dave & P. UdayaBhaskar, Cengage Learning.

Course Outcomes

1. Student will have knowledge on the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
2. Student will have knowledge on the concepts of the ecosystem and its function in the environment, biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
3. Student will have knowledge on various attributes of the pollution and their impact and measures to reduce or control the pollution along with waste management practices.
4. Student will have knowledge on social issues both rural and urban environment and the possible means to combat the challenges.
5. Student will have knowledge on the environmental legislations of India and the first global initiatives towards sustainable development, environmental assessment and the stages involved in EIA and the environmental audit.

A1CHT001ENVIRONMENTAL STUDIES											
Course designed by	CHEMICAL ENGINEERING										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	✓			✓	✓			✓	✓	✓	

A1CHT001ENVIRONMENTAL STUDIES

Course designed by	CHEMICAL ENGINEERING
Approval	Approved by: Meeting of Board of Studies held on_13/06/2015
	Ratified by: 1st Meeting of Academic Council,27thJune, 2015

A1EHL001	ENGLISH LANGUAGE PRACTICE -I	L	T	P	C
		1		2	2
	Total Contact Hours – 45				

COURSE OBJECTIVES	
COBJ1	Student will get exposure to important concepts of English Language.
COBJ2	Student will gain an understanding of Syntactical and Grammatical Components of English Language and their correct use
COBJ3	Student will get proficiency in all four skills of Language – Listening, Reading, Speaking and Writing
COBJ4	Student shall be able to comprehend and analyze the core concepts well

Orientation **– 3 hrs**

UNIT I **– 8 hrs**

- Etymology – Word Study and Formation
- Kernel Structures
  - Refresher on Parts of Speech
  - Basic Types of Sentences
  - Subject Verb Concord
  - Tense, Time, Aspect
  - Error Detection
- Greetings and Introducing

UNIT II **– 8 hrs**

- Transformation of Sentences
  - Speech
  - Voice
- Paragraph Writing
  - Scrambled Sentence
  - Use of Connectives
  - Cohesiveness and Coherence
- Situational Conversations
- JAMS

UNIT III **-8 hrs**

- Transformation of Sentences
  - Degrees of Comparison
  - Simple, Compound, Complex
- Participatory Roles for Conduction Events
  - Preparing Welcome Speeches
  - Proposing Vote of Thanks
  - Introducing Guests
- Basic Listening Skills

UNIT IV **-6 hrs**

- Letter Writing
  - Leave Application
  - Invitations
  - Greetings
- Mentoring a Discussion
- Add making

UNIT V **– 6 hrs**

- Writing for Specific Purposes
  - Circulars
  - Notices
  - Banners/Advertisements
  - Captions/Slogans
- Reading Techniques
  - Skimming
  - Scanning
  - Referral Reading
  - Reading for Specific Purpose

UNIT VI **– 6 hrs**

- Note Making
- Note Taking
- Translation
- Reading for Comprehension

TEXT BOOKS: Institute's Compilation from the Sources:

1. Language Through Literature -1&2 of OUP
2. Composition Models and Exercises by John E. Warriner of Harcourt Brace Jovanovich
3. Pan Piper Series of Good, Better, Best English of G H Vallins
4. Pitman Series of Words are Important Books 1-3
5. Living English Structures by Stannard Allen of Pearson Publication
6. Developing English Skills, Edited by PK Thaker et al of OUP

REFERENCE BOOKS

1.	Fundamentals of Technical Communication by Meenakshiraman, Sangeta Sharma of OUP
2	Basics of Communication in English by Francis Soundararaj of Trinity Publications
3	English for Engineers and Technologists by Orient Blackswan
4	Basic Communication Skills for Technology by Andrea J. Rutherfoord of Pearson Publications
5	Personality Development and Soft Skills by Barun K. Mitra of OUP
6	Practical English Grammar by Thomson and Martinet of OUP
7	Covey Sean "Seven habits of highly Effective Teens" Newyork Fireside Publishers, 1998
8	Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering,. Orient Blackswan Ltd. 2009
9	Enriching Speaking and Writing Skills , Orient Blackswan
10	John Seely The Oxford Guide to Writing and Speaking, OUP

Course Outcomes:

CO1	Student shall have the ability to understand the syntactical and grammatical intricacy
CO2	Student shall be able to use right structure for right context and meaning.
CO3	Student shall be able to read and comprehend the content in English well
CO4	Student shall be able to write well for his/her professional requirement
CO5	Student shall be able to Speak in English well
CO6	Student shall be able to understand and analyze the core components of his study well

A1EHL001 – ENGLISH LANGUAGE PRACTICE -I											
Course designed by	English and Humanities										
CO / PO mapping (SIZE:12)	a	b	c	d	e	f	g	h	i	j	k

A1EHL001 – ENGLISH LANGUAGE PRACTICE -I	
Course designed by	English and Humanities
Approval	Approved by: Meeting of Board of Studies held on 18th June, 2015
	Ratified by: 1st Meeting of Academic Council, 27thJune, 2015

A1PYL001	SEMESTER - I	L	T	P	C
	ENGINEERING PHYSICS LAB	0	0	3	2
	Total Contact Hours - 42				
	Prerequisite : None				

COURSE OBJECTIVES	
COBJ 1.	To experimentally demonstrate the phenomena of interference and diffraction of light waves by suitable arrangement of various optical devices and to determine the numerical aperture and bending loss of the optic fiber.
COBJ 2.	To experimentally demonstrate the response of a magnetic material in external magnetic field and magnetic field due to currents.
COBJ 3.	To experimentally determine the specific heat and coefficient of thermal conductivity for the given materials.
COBJ 4.	To experimentally determine the resultant of the system of forces and coefficient of friction.

LIST OF EXPERIMENTS

1. Newton's Rings method- Determination of the radius of curvature of the plano-convex lens.
2. Wedge method- Determination of the thickness of the given very thin object (hair/paper)
3. Diffraction grating- Determination of the wavelength of the most prominent lines in the mercury spectrum using spectrometer and a plane transmission grating.
4. LASER- Determination of wavelength of the laser beam due to diffraction at single slit.
5. LASER- Determination of the angle of divergence.
6. Optic Fiber – Determination of Numerical aperture and bending loss.
7. B-H curve – Determination of coercively and retentively of a ferromagnetic material.
8. Stewart & Gees apparatus- Study of the variation of the magnetic field along the axis of a current carrying circular coil.
9. Determination of coefficient of resistance of the given material
10. Determination of dielectric constant of given ferroelectric material.
11. Determination of specific heat of material.
12. Determination of coefficient of thermal conductivity of a bad conductor by Lee's disc method.
13. Determination of coefficient of friction of a given material.

TEXT BOOKS

1. A textbook of practical physics by M.N. Srinivasan, S. Chand & Co. Publishers

COURSE OUTCOMES

CO 1. Student will be able to experimentally observe interference and diffraction patterns of light waves due to different optical devices and to determine the numerical aperture and bending loss of the optic fiber.

CO 2. Student shall experimentally study the magnetic hysteresis and determine related parameters and study the variation of magnetic fields due to currents using tangent law.

CO 3. Student will be able to detrmine the specific heat and coeffecient of thermal conductivity for the given materials.

CO 4. Student will be able to detrmine the resultatnt of the system of foces and coeffecient of friction.

A1PYL001- ENGINEERING PHYSICS LAB											
Course designed by	DEPARTMENT OF PHYSICS										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	√	√		√							

A1PYL001- ENGINEERING PHYSICS LAB	
Course designed by	**DEPARTMENT OF PHYSICS**
Approval	Approved by: Meeting of Board of Studies held on 23rd June, 2015
	Ratified by: 1st Meeting of Academic Council, 27thJune, 2015

A1CIL001	SEMESTER - I	L	T	P	C
	COMPUTER PROGRAMMING LAB	-	-	3	2
	Total Contact Hours – 39 Hours (13 Weeks)				
COURSE OBJECTIVES					
COBJ1.	Students will experiment with basic data types, operators, expressions and expression evaluation mechanisms using C Programming Language.				
COBJ2.	Students will experiment with different control flow constructs in C Programming Language and will understand the syntax, semantics and usability contexts of these different constructs.				
COBJ3.	Students will experiment with composite data types in C and constructs available to develop their own data-types, utilize them to model things and dealing with data from and to external files.				
COBJ4.	Students will experiment with different variations of the constructs available for practicing modular programming and understand the pros and cons of using different variants.				

SYLLABUS

WEEK-1: [Basics of creating a C Program on Windows & LINUX platforms, scanf&printf]

1. Introduction to Linux based gcc Compiler. Basic commands of Linux, Editing (Vi or Vim Editor), Creating a file, creating a folder, ls, mkdir, man,cd, rmdir, mv etc. Practice on LINUX commands.
2. "Hello World" Program on Turbo C and gcc.
3. To read two numbers and display their sum.

WEEK-2: [Variables, Data-Types, Operators, Expression Evaluation]

4. Swapping of two numbers, with and without using third variable.
5. To find largest of three numbers, with and without ternary operator.
6. To find area of a triangle, using Heron's formula

WEEK-3: [Operators, Data-Types, decision-making constructs, For Loops]

7. To calculate Simple Interest and Compound Interest, given Principle, rate of interest per annum, and period.
8. To convert a given temperature from degrees Celsius to degrees Fahrenheit, vice-versa.
9. To print first *n* natural numbers.

WEEK-4: [Loops]

10. To find Sum and Mean of *n* numbers, read *n* from user.
11. Read 10 numbers from the user, count number of odd and even numbers.
12. Read *n* numbers and to count number of prime numbers.

WEEK-5: [Loops]

13. To accept an integer and to find sum of individual digits of that number and also print and save it in reverse order.
14. To display Fibonacci series up-to *n*.
15. To find the n^{th} Fibonacci number.

WEEK-6: [Switch, One-Dimensional Arrays]

16. To implement a calculator program using switch case. Create a calculator program which can perform +, -, *, / and % using switch case. Accept operand1, operand2 and the operator from the user. Continuously run the calculator until the user presses '#' symbol. '#' means the user wants to come out of the program.
17. To read an alphabet from the user and convert lower to upper and upper to lower case using switch case.
18. To declare, initialize and display a one dimensional array of integers of size 5.
19. To declare, initialize and display a one dimensional array of characters of size 5.
20. To read marks of 5 subjects, store them in an array. Find the lowest and highest marks.

WEEK-7: [Two-Dimensional Arrays]

21. Declare, initialize, and display a 2-D array of (3x4) matrix.
22. Declare, initialize and display names of 5 students (Array of Strings).
23. To read two matrices, check the necessary condition and to find the sum and display the result in matrix format.

WEEK-8: [Matrices]

24. To read to matrices, check the necessary condition, and to display the product of the matrices.
25. To find transpose of a matrix.
26. To find the sum of squares of the diagonal elements of a matrix.

WEEK-9: [Functions and Recursion]

27. Write a function to calculate factorial of a number, a) Norma Function b)Recursive Function.
28. To find GCD of two numbers, with and without recursion.
29. To generate prime numbers between 1 to n, user a function to check if a number is prime or not.

WEEK-10: [Pointers, Functions, Arrays]

30. To understand the difference between pass by value and pass by reference, write a c program to find sum of two numbers using functions.
31. To demonstrate the difference between pointer to an array and array of pointers.

a) Store your name, address and phone number in a 2-D character array, and display the same using pointer notations.

b) Use pointer to an array and array of pointers.

32. Use pointer to notations to read and display a 3x4 matrix.

WEEK-11: [Structures, Unions, Bit-Fields]

33. To read two complex numbers and display the sum and product using structures.
34. To read the data of four students, each student has a name (string), roll number (string), age(integer), use an array of structure. Later find the average age of the students.
35. A program to demonstrate the difference between structure and union.
36. To declare a structure using bit fields, to save a DATE, use 5-bits for DD, 4 bits for MM, remaining for YY. Read and display a date from the user.

WEEK-12: [Pointers, Strings]

37. To copy contents of one string to another, with and without using string functions.
38. To concatenate string1 with string2, with and without using string functions.
39. To compare two string with and without using string functions.
40. Write a program to add 2 matrices, with the dimension of the matrix specified by the user at the time of executing the problem.

WEEK-13: [Files]

41. To count number of characters and lines of a File.
42. To display the contents of a file and also to copy the contents of one file to another.

COURSE OUTCOMES

CO1 Have the ability to pick and choose the required built-in data-types for the specific problem and utilize the full power of operators and expression evaluation of C Language while writing programs for any given problem.

CO2 Have the ability to use choose and utilize different control constructs in C Language depending on the context of the need while developing a C program for any specific problem.

CO3 Have the ability to divide the parts of a program solution into functions and write a program in C as an inter-play of functions using each other in what is called modular programming.

CO4 Have the ability to fully appreciate the concept and utilization of single and multi-dimensional arrays of different data-types in C.

CO5 Have the ability to appreciate the concept of address variables and understand the benefits and utilization of the same along with under the flexibility provided by dynamic memory allocation and its comparison to static memory allocation.

CO6 Have the ability to appreciate the concept of user defined data types and utilize these concepts to define new composite data types as required for implementing solutions to a problem in a C program.

CO7 Have the ability to appreciate the library support available in standard C for dealing with external files both for read and write purposes and use them as required while developing C Programs.

<A1CIL001><COMPUTER PROGRAMMING LAB>													
Course designed by		< COMPUTER SCIENCE & ENGINEERING>											
1	Course/Program outcomes mapping	a	b	c	d	e	f	g	h	i	j	k	l
		√	√		√			√		√			√
2	Approval	Approved by: Meeting of Board of Studies held in the month of June, 2015											
		Ratified by: 1st Meeting of Academic Council, 27th June, 2015											

A1MAT002	SEMESTER - II	L	T	P	C
	MATHEMATICAL METHODS	3	1*	-	3
	Total Contact Hours – 45				
	Prerequisite : None				
COURSE OBJECTIVES					
COBJ1	To understand the concept of consistency of linear system of equations				
COBJ2.	To learn the method of finding Eigen values and Eigen vectors for a given matrix, and also the knowledge of converting quadratic form to canonical form				
COBJ3.	To learn the methods of solving transcendental equations and to obtain the Knowledge in applying techniques of interpolation for equally and unequally spaced points.				
COBJ4.	To obtain the knowledge of solving of first order first degree differential equations through various numerical methods.				
COBJ5	To understand the definition and scope of Z-transforms.				

SYLLABUS

UNIT I: LINEAR ALGEBRA

Rank of a matrix- Normal form of a matrix – Solution of Linear System of equations - Gauss Elimination method - Gauss Seidel Method.

UNIT – II: EIGEN VALUES AND EIGEN VECTORS:

Eigen values - Eigen vectors – Properties of Eigen values (statements only) – Cayley Hamilton Theorem (without proof)- reduction to diagonal form- Reduction of quadratic form to canonical form-Nature of quadratic form.

UNIT-III: NUMERICAL SOLUTION OF EQUATIONS:

Solution of Algebraic and transcendental equations- Bisection Method – Method of False Position – Iteration Method – Newton Raphson Method.

UNIT – IV: FINITE DIFFERENCES AND INTERPOLATION:

Finite differences – Newton's interpolation formulae – Central difference interpolation-Gauss forward, Gauss backward interpolation (only statements) - Lagrange's Interpolation.

UNIT–V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:

Picard's Method - Taylor's series method -Euler's Method - Fourth order Runge-Kutta Methods (all without proofs).

UNIT – VI: Z-TRANSFORMS:

Introduction – definition-some standard Z-transforms- properties :Linearity property, Damping rule , Shifting rule ,Multiplication by 'n' - Initial and final value theorems-
Some useful inverse z-transforms - Convolution theorem (statement without proof)- Evaluation of Inverse Z-transforms-power series method-partial fraction method-Application to difference equations.

Text Book :

1. B.S.GREWAL, Higher Engineering Mathematics, 42nd Edition, Khanna publishers

Reference Books:

1. Introductory Methods of Numerical Analysis by S.S.Sastry, PHI publications
2. *Numerical Methods* For Scientific And Engineering Computation by M. K. Jain, *S. R. K. Iyengar* and R. K. Jain, Publisher: New Age publication

COURSE OUTCOMES:

CO1. Student will be able to obtain the solution of linear system of equations which frequently occur in engineering problems
CO2. Student will gain the proficiency in finding the Eigen values and Eigen vectors and reduction of quadratic forms to canonical forms
CO3. Student will be able to estimate the missing terms of given data using interpolation.
CO4. Student will be able to solve Initial value problems through numerical methods.
CO5. Student will be able to find the solution of Difference equations which arise in discrete time systems.

A1MAT002- MATHEMATICAL METHODS											
Course designed by	DEPARTMENT OFMATHEMATICS										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	X				X						X

A1MAT002- MATHEMATICAL METHODS

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1CYT001	SEMESTER - II	L	T	P	C
	ENGINEERING CHEMISTRY	3	-	-	3
	Total Contact Hours – 45				
COURSE OBJECTIVES					
1.	For prospective engineers, knowledge about water used in industries (boilers etc.) and for drinking purposes is necessary; hence chemistry of hard water, boiler troubles and modern methods of softening hard water are introduced.				
2.	Knowledge of galvanic cells, concentration cells is necessary for engineers to understand corrosion and its control; also this knowledge helps in understanding modern bio-sensors and fuel cells.				
3.	The problems associated with corrosion and knowledge for control, awareness is necessary for all branches of engineering.				
4.	Plastics are widely used engineering materials and understanding their properties helps in selecting suitable materials for various purposes. Engineers should also be aware some of the advanced polymer materials that have specific significance.				
5.	A broad understanding of the fuels employed on a large scale is necessary for all engineers to understand energy – related problems and solving them.				
6.	Prospective engineers are expected to know about some of the advanced materials that are becoming available. Hence some of them are introduced here.				

SYLLABUS:

UNIT-1: WATER TECHNOLOGY: Hard& soft water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – scale formation, corrosion, caustic embrittlement, -Priming and foaming , – Softening of water – Lime soda process (cold & hot), Numerical problems on Lime Soda requirements for softening – Zeolite method- Ion exchange process - Reverse osmosis – Electro Dialysis.

UNIT-2 : ELECTROCHEMISTRY: Concept of Ionic mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells — glass electrode, ion selective electrode (Fluoride and enzyme based) -Potentiometric titrations – Concentration cells – Batteries(Alkaline battery, Nickel Cadmium Battery, Lead acid battery, introduction to solid state battery, Li ion battery with reactions) and Fuel cells(H2-O2 and Methanol-Oxygen).

UNIT-3 : CORROSION: Causes and effects of corrosion – theories of corrosion (dry/chemical and electrochemical corrosion) – Factors effecting corrosion – Corrosion control methods – Cathode protection –Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning , Cladding, Electroplating), – Organic surface coatings – Paints , their constituents and their functions.

UNIT-4 : HIGH POLYMERS: Types of polymerization – Stereo specificity of polymers – properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC

and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications. Fibre reinforced plastics – Biodegradable polymers – Conducting polymers and their applications.

UNIT-5: FUELS: Coal – Proximate and ultimate analysis – Numerical problems based on coal analysis – Calorific value – HCV and LCV – determination of calorific value by bomb calorimeter – numerical problems based on calorific values; Petroleum – Refining – Cracking, Petrol &Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – numerical problems on air requirements for combustion.

UNIT-6: CHEMISTRY OF MATERIALS

1. Nanomaterials- structure, synthesis, properties and applications of carbon nanotubes (fullerenes, SWNT, MWNT).
2. Green chemistry - Methods for green synthesis (at least three) and their applications.
3. Solar cells- construction and working -Solar heaters – Photo voltaic cells – Solar reflectors
4. Cement – types of cement, Manufacture of Portland cement – Reactions involved- setting and hardening – decay of cement.
5. Lubricants- Definition–Mechanisms of lubrication- importance of lubrication.
6. Introduction to liquid crystals.

PRESCRIBED TEXT BOOK

1. Jain and Jain (Latest Edition), Engineering Chemistry, DhanpatRai Publishing company Ltd,

STANDARD BOOKS

2. Chemistry for Engineers, Teh Fu Yen, imperial college press, London
3. S.S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series

REFERENCES

4. K.SeshaMaheswaramma and MridulaChugh (2013), Engineering Chemistry, Pearson Publications.
5. Advanced Engineering Chemistry, M. R. Senapati, Laxmi Publications Pvt Ltd.
6. Kamaraj. P &Arthanareeswari.M, "*Applied Chemistry", 9th Edition*, Sudhandhira Publications, 2012.
7. Text book of Engineering Chemistry, Sashi K Chawala, DhanpatRai Publications, New Delhi.

COURSE OUTCOMES:

1. Students gain the knowledge about water used in industries (boilers etc) and for drinking purpose, difference between hard water and soft water, estimation of hardness of water and specification of potable water and purification of sea water through reverse osmosis.

2. Students gain the knowledge of galvanic cells, concentration cells, applications of ion selective electrodes, Conductometry and Potentiometry to understand the principle and applications of electrochemistry. Topics on electrochemical cells, batteries and fuel cells make students understand the alternate sources of energy and also help them to tackle problems of corrosion and control.

3. Students gain the knowledge on mechanism of corrosion, factors responsible, types corrosion and methods of protection.

4. Students gain the knowledge on structure, synthesis properties and applications of polymers, additives to be mixed with polymers to obtain desired plastics and moulding techniques, advanced topics on plastics like conducting polymers and biodegradable polymers, fibre reinforced plastics and bullet proof plastics, synthetic plastics that are essential to latest technology.

5. Student gain the knowledge on the determination of calorific value by bomb calorimeter, the proximate and ultimate analysis of coal, Fractional distillation of crude, followed by catalytic cracking to obtain the liquid fuels for the functioning of internal combustion engine, octane and cetane number, which have large focus on oil industry.

6. Students gain knowledge on advanced materials like carbon nano tubes and fullerenes, their properties and applications, manufacturing of cement, need for green chemistry, principles of green chemistry solar cells and greenhouse effect and their importance.

A1CYT001- ENGINEERING CHEMISTRY											
Course designed by	Department of Chemistry										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	✓			✓	✓			✓	✓	✓	

A1CYT001- ENGINEERING CHEMISTRY

Course designed by	Department of Chemistry
Approval	Approved by: Meeting of Board of Studies held on 23-06-2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1EET001	SEMESTER - II	L	T	P	C
	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	3	1	-	3
	Total Contact Hours – 48				
	Prerequisite: Basic Engineering Mathematics				
COURSE OBJECTIVES					
1.	Understand the fundamental concepts of circuits				
2.	Understand the basic operational characteristics of different electrical machines				
3.	Understand the working principle of different types of semiconductor devices and transducers.				
4.	Learn the concepts of Communication Systems				

SYLLABUS

UNIT I

FUNDAMENTAL CONCEPTS OF ELECTRICAL CIRCUITS:

Ohm's Law-Statement - Illustration and Limitation - Unit – Work, Power and energy (Electrical, Thermal and Mechanical) - Circuits – Identifying the Elements and the Connected Terminology - Kirchoff's Laws – Statement and Illustration - Resistance in Series and Voltage Division Technique - Resistance in Parallel and Current Division Technique - Method of solving a Circuit by Kirchoff's Laws - Star to Delta and to Star Transformations - Concept of 3-phase EMF Generation - Root Mean Square (RMS) or Effective Value - Average Value of AC - Phasor Representation of Alternating Quantities - Analysis of AC Circuit - Representation of Alternating Quantities in Rectangular and Polar Forms - Simple Method of Solving Parallel AC circuits - Three-phase AC circuits

UNIT – II

ELECTRICAL MACHINES:

DC Generator – principle of operation – characteristics - DC Motor - principle of operation – characteristics – Transformers - principle of operation - regulation – efficiency- Three-phase Induction Motor - principle of operation – characteristics - Single-phase Induction Motors - principle of operation – characteristics - 3-phase AC generator or Alternator – regulation - Synchronous Motor principle of operation – characteristics.

UNIT – III

MEASURING INSTRUMENTS AND FUNDAMENTALS OF ELECTRICAL WIRING:

Classification of Instruments - Basic Principles of Indicating Instruments - Induction Type Energy Meter – Megger - Writing Materials and Accessories - Types of Wiring - Basic Principles of Earthing - Wiring Layout for a Residential Building - Power Generation - Transmission System - Comparison of Overhead (OH) and Underground (UG) Systems.

UNIT – IV

PN JUNCTION DIODE AND TRANSISTOR: Review of Semi Conductor Physics, Open circuited P N Junction, Forward and Reverse Bias, Diode Resistance (Static and Dynamic), Zener Diode, Break Down mechanisms, Zener diode applications, Half wave rectifier, Full wave rectifier, Bipolar Junction transistor, Transistor current components, operation of NPN and PNP Transistor, Transistor CB, CE and CC configurations, Transistor as an amplifier and CE amplifier.

UNIT – V

TRANSDUCERS: Capacitive Transducer, Inductive Transducer, Linear Variable Differential Transformer (LVDT), Oscillation Transducer, Potentiometric Transducer, Electrical Strain Gauges, Resistance Thermometer, Thermistor, Thermocouple, Hall Effect, Piezoelectric Transducer, Photoelectric Transducer.

UNIT – VI

COMMUNICATION SYSTEMS: Communication System, Telecommunication Services, Analog and Digital Signals, Need for Modulation, Analog Modulation, Pulse Modulation, Pulse Digital Modulation-Pulse Code Modulation (PCM), Digital Modulation Techniques, Data Transmission, Radio transmitter(AM&FM), Radio receiver.

TEXT BOOKS:

1. R Muthusubramanian and S Salivahanan, "Basic Electrical and Electronics Engineering" Mc-Graw Hill, August 2009.

REFERENCES BOOKS:

1. Electronic Devices and Circuits by J. Millman, C.C. Halkias and Satyabrata Jit, Tata Mc-Graw Hill 2nd Edition
2. Kothari D. P and Nagrath IJ, Basic Electrical Engineering, Tata McGraw- Hill, 1991.

Course Outcomes:

1. Able to analyze various types of electrical circuits
2. Ability to identify suitable machine for a particular application
3. Have the ability to explain the working principle of different types of semiconductor devices.
4. Have the ability to explain the concepts of Communication Systems.

A1EET001- BASIC ELECTRICAL & ELECTRONICS ENGINEERING											
Course designed by	Electrical & Electronics Engineering Department										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
Able to analyze various types of electrical circuits	H	M			H			M			
Ability to identify suitable machine for a particular application	H	M	L					M			L
Have the ability to explain the working principle of different types of semiconductor devices.	H	M						M			
Have the ability to explain the concepts of Communication Systems.	H							M			L

A1EET001- BASIC ELECTRICAL & ELECTRONICS ENGINEERING	
Course designed by	Electrical & Electronics Engineering
Approval	Approved by: Meeting of Board of Studies held on June 13, 2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1CET002	SEMESTER - II	L	T	P	C
	APPLIED MECHANICS	3	1	0	3
	Total Contact Hours – 48				
	Prerequisite : Basic Physics and Mathematics				

COURSE OBJECTIVES	
1.	To understand the concepts of system of forces, resolution of forces and application of friction
2.	To comprehend the importance of Centroid, Moment of Inertia and its applications
3.	To be exposed to analysis of plane trusses by method of joints and method of sections
4.	To understand the concepts of kinematics and kinetics

SYLLABUS

UNITI **Total=09hrs**

FORCES & FRICTION

Introduction to Engineering Mechanics- basic concepts, equilibrium of forces, Triangle law of forces, polygon law of forces, Lami's theorem, forces in space. Friction-, Sliding friction and Ladder friction and applications of friction.

UNIT II **Total=07hrs**

CENTROID AND CENTRE OF GRAVITY:

Introduction-Centroid of plane figures and compound areas; centre of gravity of simple and composite objects; Pappu's theorem-I and theorem –II

UNIT III **Total=09hrs**

MOMENT OF INERTIA

Introduction-Second moment of an area; polar moment of inertia; radius of gyration; transfer formula; moment of inertia of simple and composite areas; product of inertia of simple and compound objects- transfer formula for product of inertia; Mass moment of inertia of simple and compound objects - transfer formula for mass moment of inertia.

UNIT IV

ANALYSIS OF TRUSSES **Total=08hrs**

Definition of static determinacy and indeterminacy; Analysis of statically determinate plane trusses- method of joints and sections; analysis of statically determinate space trusses- tension coefficient method.

UNIT V

KINEMATICS: **Total=08hrs**

Rectilinear motion; curvilinear motion-fixed axis rotation- constant and variable acceleration, projectiles-horizontal and inclined projection at same level and different levels.

UNIT VI

KINETICS: **Total=7hrs**

Newton's second law; Translation and Fixed axis rotation; D'Alembert's principle; concept of work energy equation and impulse momentum equation.

TEXT BOOKS:

Engineering Mechanics, S.Timoshenko & D.H Young, McGraw Hill publications.
Engineering Mechanics, S. S. Bhavikatti, K. G. Rajashekarappa
Engineering Mechanics,Basudeb Bhattacharyya, Oxford University Press

REFERENCE BOOKS:

Engineering Mechanics statics R C Hibbler, Pearson Publ.
Engineering Mechanics – Fedinand L Singer, Harper Collins publ.

OUTCOMES:

1. Learners will be able to understand the concepts of forces in space and their analysis
2. Learners will be able to apply the concepts of Centroid and moment of inertia in engineering applications
3. Will be above to understand the concept of analysis of plane trusses
4. Will be able to understand the concepts and applications of kinematics and kinetics

A1CET002 APPLIED MECHANICS											
Course designed by	Department of Civil Engineering										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√			√	√						√

A1CET002 APPLIED MECHANICS	
Course designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 17th June, 2015
	Ratified by: 1st Meeting of Academic Council, 27thJune, 2015

A1EHL002	SEMESTER - II	L	T	P	C
	ENGLISH LANGUAGE PRACTICE -II	1	0	2	2
	Total Contact Hours – 45				
	Prerequisite: English Language Practice -I				

COURSE OBJECTIVES	
COBJ1	Student will get exposure to advanced concepts of English Language.
COBJ2	Student will gain an understanding of sounds of English Language and their correct use
COBJ3	Student will get exposure in articulatory and argumentative skills
COBJ4	Student shall be able to acquire specific skills of speaking and writing for professional requirement

Orientation **3 hrs**

Unit -1 **6 hrs**

- Phrasal Verbs
- Prepositional Verbs
- Idiomatic Expressions
- Foreign Expressions
- Pronunciation Practice- distinct sounds

Unit -2 **6 hrs**

- Pronunciation Practice- Word Accent
- Telephonic Conversation
- Listening Comprehension
- Video Profiles

Unit -3 **6 hrs**

- Elocution
- Debates
- Group Discussion

Unit -4 **8 hrs**

- Resume` writing
- Interviews
- Professional Etiquette
- Pronunciation Practice – Accent in Connected Speech

Unit -5 **8 hrs**

- Sentence Completion
- Cloze Passages
- Verbal Analogy
- Reading Comprehension
- Pronunciation Practice- Tone

Unit -6 **8 hrs**

- Memos
- E-mails
- Technical Reports
- Presentations
- Pronunciation Practice – Rhythm

TEXT BOOKS: Institute's Compilation from the Sources:

7. Language Through Literature -1&2 of OUP
8. Fluency in English part I & II of OUP
9. The Students' Companion by Terry O'Brien of Rupa Publication
10. Living English Speech by Stannard Allen of Pearson Publication
11. Common Errors in English by F.G. French, CBE of OUP
12. English at the Workplace II of OUP

REFERENCE BOOKS

1.	English Idioms by Jennifer Seidl, W. McMordie of OUP
2	Effective Business Communication by Francis Soundararaj of Trinity Publication
3	English for Effective Communication by Sanjay Kumar, Pushp Lata of OUP
4	Word Origins and Their Romantic Stories by Wilfred Funk of Goyl SaaB Publications
5	How to Do Well in GDs and Interviews by Pearson Publications
6	Spoken English by Bansal and Harrison of Orient Longman
7	Covey Sean "Seven habits of highly Effective Teens" Newyork Fireside Publishers, 1998
8	The Leader in You by Dale Carnegie & Associates, INC
9	Objective English for Competitive Examinations by hari Mohan Prasad and Uma Rani Sinha of McGraw Hill
10	Exploring Strategy: Text and Cases by Gerry Johnson of Viva Books Pvt. Ltd.

Course Outcomes:

CO1	Student shall have the ability to speak intelligibly
CO2	Student shall be able to use phrases, foreign expressions and idioms correctly
CO3	Student shall be able to participate well in debates and discussions
CO4	Student shall be able to write both Technical and General reports well
CO5	Student shall be able prepare resume well and face the interviews confidently
CO6	Student shall communicate confidently and effectively

A1EHL002 – ENGLISH LANGUAGE PRACTICE -II											
Course designed by	English and Humanities										
CO / PO mapping (SIZE:12)	a	b	c	d	e	f	g	h	i	j	k

A1EHL002 – ENGLISH LANGUAGE PRACTICE -II

Course designed by	English and Humanities
Approval	Approved by: Meeting of Board of Studies held on 18th June, 2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1CYL001	SEMESTER - II	L	T	P	C
	ENGINEERING CHEMISTRY LAB	-	-	3	2
	Total Contact Hours – 45				
COURSE OBJECTIVES					
1.	To understand the method of determination of concentrations acid/base, total hardness, iron and zinc contents in the sample solution.				
2.	To understand the principles of conductometric, potentiometric pH metric and colorimetric methods of determination.				
3.	To understand the construction of galvanic cell, determination of calorific value and preparation of biodiesel.				

SYLLABUS

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary StandardSolutions, Volumetric titrations, Quantitative and Qualitative analysis etc.
2. Determination of Concentration of a strong acid HCI using standard Na_2CO_3
3. Determination of $KMnO_4$ using standard Sodium Oxalate.
4. Determination of Ferrous iron using standard $K_2Cr_2O_7$
5. Determination of Zinc using standard potassium Ferro cyanide solution
6. Determination of Total Hardness of water using standard EDTA solution.
7. Determination of iron III with KSCN by spectrophotometry.
8. Determination of Copper using EDTA solution.
9. pH metric titration between strong acid and strong base.
10. Conductometric Titration of a strong acid with strong base & weak acid with strong base.
11. Determination of Ferrous iron with standard $K_2Cr_2O_7$ by Potentiometric Titrationmethod.
12. Ore analysis: a. Determination of percentage purity of MnO_2 in Pyrolusite
    (or)
    b. Determination of percentage purity of Dolomite.
13. Determination of rate constant of acid catalyzed hydrolysis of an ester.
14. Determination of distribution coefficient of benzoic acid between benzene and water
15. Advanced Design Experiment (01): Production of Biodiesel
16. Advanced Design Experiment (02): Construction of a Galvanic cell
17. AdvancedDesign Experiment – Demo- Working on UV-VIS Spectrophotometer, Fluoride Ion Selective electrode for detection of fluoride.
18. Determination calorific value by using bomb calorimeter and Junker's (Demo)
19. Measurement of acid concentration used in lead storage cell using Hydrometer
20. Fuels Experiments: a. Determination of Viscosity, Flash Point and Fire point (or)
    b. Determination of calorific Value by Bomb Calorimeter (or)
    c. Determination of calorific Value by Junker's Calorimeter
21. Construction and Working Principle of a Fuel Cell (demo experiment)

Note. A candidate is required to carry out a minimum of TEN experiments in a semester.

STANDARD BOOKS

1. Text of Quantitative Chemical analysis, A I Vogel, 6th Edition, Cengage Learning.
2.Quantitative Chemical Analysis, Day and Underwood, Prentice Hall Publications.
3. Practical Engineering Chemistry, K. Mukkanti (2009), B.S. Publication.

REFERENCE BOOKS:

4.Dr. JyotsnaCherukui (2012) Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
5.Laboratory manual developed by Department of chemistry, MVGR College of Engineering.

COURSE OUTCOMES:

1.Students will gain knowledge on the method of determination of acid/base, total hardness, iron and zinc contents in the sample solution.
2.Students will gain knowledge on the principles of conductometric, potentiometric, pH metric and colorimetric methods of determination.
3.Students will understand in construction of galvanic cell, determination of calorific value, and preparation of biodiesel.

A1CYL001- ENGINEERING CHEMISTRY LAB											
Course designed by	Department of Chemistry										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	✓	✓		✓							

A1CYL001- ENGINEERING CHEMISTRY LAB

Course designed by	Department of Chemistry
Approval	Approved by: Meeting of Board of Studies held on 23-06-2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1MEW001	SEMESTER - II	L	T	P	C
	BASIC ENGINEERING WORKSHOP	0	0	3	2
	Total Contact Hours – 42				
COURSE OBJECTIVES					
1.	THE STUDENT WILL BE ABLE TO TROUBLE SHOOT VARIOUS INFRASTRUCTURAL SUPPORT SYSTEMS LIKE PLUMBING, ELECTICAL, NETWORKING etc				
2.	THE STUDENT WILL BE ABLE TO DESIGN VARIOUS INFRASTRUCTURAL SUPPORT SYSTEMS				
3.	THE STUDENT WILL BE ABLE TO ESTIMATE VARIOUS INFRASTRUCTURAL SUPPORT SYSTEMS				

List of Experiments

Note: At least two exercises to be done from each engineering field

Mechanical Engineering:

1. Development of plumbing layout system for domestic applications and address trouble shootings in basic plumbing emergencies.(water leakage of a tap, toilet cistern)
2. Development of surface profile for given object using G I sheet.
3. Assembly and disassembly of mechanical units using power driven hand tools (cutting, grinding, drilling, riveting)

Civil Engineering

1. Building planning and estimation
2. Masonry related work – estimation and hands-on
3. Carpentry related work – estimation and hands-on

Computer Engineering:

Week 1: Introduction to PC Hardware

- Demonstration of Inside Components of a PC
- I/O ports

Week 2: Installation of Operating System

- Partitions Creation
- Device Driver Installation
- Assigning IP Address

Week 3: Internet Connectivity

- Getting Internet using
  - Wired/Wireless Broad band
  - Data Card
  - Through Proxy
- Installation of Tomcat/Apache

Electrical Engineering

1. Selection of wires and identification of electrical parts
2. Identification of wiring requirements for a given building
3. Load calculation given connected utilities and cost estimation

Electronics Engineering:

1. Parts identification and selection
2. Soldering electronic components onto PCB
3. Testing and use of electronic measurement equipment (meters, CRO etc.)

OUTCOMES:

i. Will be aware of the basic engineering trades and be able to execute related work at a rudimentary level.

ii. Will be able to select and use proper tools for the different tasks.

iii. Will be able to apply knowledge and skills developed to handle real-life situations in these areas.

A1MEW001BASIC ENGINEERING WORKSHOP												
Course designed by	Department of Mechanical Engineering											
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k	l

A1MEW001BASIC ENGINEERING WORKSHOP	
Course designed by	Department of Mechanical Engineering
Approval	Approved by: Meeting of Board of Studies held on 17th June, 2015
	Ratified by: 1st Meeting of Academic Council, 27th June, 2015

A1CET201	SEMESTER - III	L	T	P	C
	STRENGTH OF MATERIALS –I	3	1	0	4
	Total Contact Hours – 48				
	Pre-requisites: Applied Mechanics and Mathematics				

COURSE OBJECTIVES	
1.	To introduce the concepts of Stresses and Strains due to axial force, Shear force and Bending moment.
2.	To understand the variation of Bending Moment & Shear force of statically determinate beams for different loading conditions
3.	To understand the deflections and slopes in statically determinate beams
4.	To give insight into stresses developed in thin cylinders

SYLLABUS

UNIT I

Simple Stresses and Strains: **Total = 8hrs**

Types of stresses and strains – Hooke's law – stress, strain variation of mild steel – Working stress – Factor of safety – Lateral strain - Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them- Stresses in prismatic and homogeneous bars, Stresses in bars of varying section – Stresses in composite bars – Strain energy- Resilience-Strain energy of prismatic bars under gradual, sudden and impact loading.

UNIT II

Shear Force and Bending Moment **Total = 8hrs**

Types of Supports -Types of beams – Concept of shear force and bending moment – Relation between S.F., B.M and rate of loading at a section of a beam. S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads and combination of these loads – Point of contra flexure, maximum bending moment.

UNIT III

Bending Stresses **Total = 8hrs**

Theory of simple bending – Assumptions – Derivation of pure bending equation- Neutral axis – Determination of bending stresses – Section modulus of rectangular, circular (Solid and Hollow), I, T, L, Triangle, Channel and built up sections of simple beams.

UNIT IV

Shear Stresses **Total = 8hrs**

Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, angle sections, channel and built up beams.

UNIT V

Deflection of Beams **Total = 10hrs**

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration, Macaulay's methods and Moment area method – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, couple (moment) and their combinations – Castigliano's theorem, application to beams with indeterminacy one.

UNIT VI

Thin Cylinders **Total = 6hrs**

Thin cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders – Introduction to Thin spherical shells.

TEXT BOOKS:

1. 'Mechanics of Structures' by S. B. Junarkar and Dr. H. J. Shah, 27th Revised and Enlarged, Charotar Publishing House, 2008
2. 'Mechanics for Engineers: Statics and Dynamics' by Beer, F. P. and Johnston, E. R. Vector, TATA McGraw-Hill.

REFERENCE BOOKS:

1. 'Mechanics of Materials' by Gere and Timoshenko, PWS Publishing Company, 1997.
2. 'Mechanics of Materials' by Shames, I. H, Prentice Hall India Ltd.
3. 'Mechanics of Materials' by Beer. F.P., Johnston E.R. and John Dewolf, Fourth Edition, Tata McGraw Hill Education..

COURSE OUTCOMES (After completion of this course, the students will be able to)

1. Determine the stresses due to axial, shear and bending moment
2. Draw Shear force and bending moment diagrams for beams
3. Calculate the deflections and slope in statically determinate beams
4. Determine the stresses developed in thin cylinders

A1CET201STRENGTH OF MATERIALS –I											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	G	h	i	j	k
CO	√				√				√		√

A1CET201STRENGTH OF MATERIALS –I	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council held on 16-04-2016

A1CET202	SEMESTER - III	L	T	P	C
	ELEMENTS OF SURVEYING	3	1	0	4
	Total Contact Hours – 48				
	Pre-requisites: Mathematics				

COURSE OBJECTIVES	
1.	To learn various surveying techniques and the methodologies to be adopted for data acquisition.
2.	To be well versed in using various surveying instruments such as Chain, Tape, Compass, Theodolite, Auto level , and Total Stations etc.,
3.	To understand the concepts of earthwork computations and curve setting
4.	To be able to analyse the data acquired in field book and prepare plans, maps etc.,

SYLLABUS

UNIT I **Total = 9hrs**

Introduction: Introduction to plane surveying, principles of surveying, chain surveying, offsets, obstacles in chaining.

Compass Surveying – Terminology, Whole Circle Bearing, reduced bearing, local attraction, errors in compass survey.

UNIT II **Total = 9hrs**

Plane Table Surveying - Merits and demerits, methods of plane table traversing, two point problem, three point problem

Leveling –Terminology, Dumpy level, temporary adjustments, Height of Instrument method, Rise and Fall method, Reciprocal leveling, Longitudinal and Cross sectional leveling, errors in leveling.

UNIT III **Total = 8hrs**

Theodolite - Types of theodolites, temporary and permanent adjustments, measurement of horizontal and vertical angles

Theodolite Traversing - Open and closed traverse – Closing errors, Balancing the error – Bowditch method – Transit method, Omitted measurements

UNIT IV **Total = 8hrs**

Tacheometry - Principle of tacheometry, stadia methods, tangential method, Trigonometric leveling, elevation of top of the tower in same plane and different planes.

UNIT V **Total = 08hrs**

Contouring and Earthwork Computations: Characteristics of contours, methods of contours, interpolation of contours, uses of contours.

Embankments and cutting for a level section with and without transverse slopes-Simpson's method, Trapezoidal method, IS 1200 Part 1 codal provisions

UNIT VI **Total = 6hrs**

Curves – Simple curves, elements of simple curves, methods of setting simple curves-Rankines method, two theodolite method.

Introduction to Total Station, GPS, Aerial Surveying (Preliminary information and use).

TEXT BOOKS

1. 'Surveying and levelling' by R. Subramanian, Oxford university press, New Delhi
2. 'Surveying (Vol – 1 & 2)' by Duggal S K, Tata Mc.Graw Hill Publishing Co. Ltd, 2004.
3. 'Surveying Vol (1, 2 & 3)' by Arrora K R Standard Book House, Delhi, 2004

REFERENCE BOOKS

1. 'Text of surveying Vol. I', by P. B. Shahani –, Oxford and IBH Publishing Co – 1980
2. "Plane Surveying", by Chandra A M , New age International Pvt. Ltd., New Delhi, 2002.
3. "Higher Surveying", by Chandra AM, New age International Pvt. Ltd., New Delhi, 2002.
4. Indian standard methods of measurement of building and civil engineering works part 1 earthwork (fourth revision)

COURSE OUTCOMES:

After completion of this course, the students will be able to

1. Comprehend various surveying equipment such as, Chain, Compass, Plane table, Dumpy Level, Auto level, and Theodolite for the measurement of distances, elevations and areas.
2. Read and Draw contour maps and determine the quantity of earthwork involved.
3. To identify and set out a suitable curve with the given data
4. Appreciate the importance of Total Station, GPS for the measurement of areas and volumes.

A1CET202ELEMENTS OF SURVEYING											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√			√	√				√	√	

A1CET202ELEMENTS OF SURVEYING	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council held on 16-04-2016

A1CET203	SEMESTER - III	L	T	P	C
	FLUID MECHANICS	3	1	0	4
	Total Contact Hours – 48				
	Prerequisite : Engineering Mechanics				

COURSE OBJECTIVES	
1	To understand the basic principles of fluid mechanics and their applications
2	To introduce the concepts of measurement of pressure and rate of low in flow fields
3	To create awareness on analysis of pipe networks
4	To give the knowledge of boundary layer theory in finding the effects on structures

SYLLABUS

UNIT I **Total=10hrs**

Fluid Properties and Measurement of Pressure

Dimensions and units - Physical properties of fluids: specific gravity, viscosity, surface tension, vapor pressure and their influence on fluid motion. Principles of pressure measurement at a point- Pascal's law (no derivation), Hydrostatic law Systems of pressure measurement – absolute and gauge pressures, Measurement of pressure by simple and differential manometers. Measurement of pressure by mechanical Bourdon's pressure gauge.

UNIT II **Total=06hrs**

Hydrostatics

Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces - Center of pressure. Archimedes principle - Buoyancy force, Stability of submerged and floating bodies.

UNIT III **Total=09 hrs**

Fluid Kinematics: Description of fluid flow- Stream line, path line and streak lines and stream tube. Classification of fluid flows. Equation of continuity for one, two, three dimensional flows - stream and velocity potential functions, flow net analysis.

Fluid Dynamics:

Euler's and Bernoulli's equations for flow along and across a streamline. Momentum equation and its application to force on pipe bend.

UNIT IV **Total=08hrs**

Closed Conduit Flow

Reynold's experiment; Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes.

Laws of Fluid friction - Darcy's equation, Minor losses. Variation of friction factor with Reynolds's number - Moody's Chart. - Total energy line and hydraulic gradient line - Pipes in series & pipes in parallel -.Pipe network problems.

UNIT V **Total=08hrs**

Measurement of Flow

Flow measurement in pipes - Pitot tube,Venturi meter and Orifice meter, Flow through orifice and mouthpiece – constant head method and variable head method, Flow measurement in open channels- sharp crested rectangular, triangular and trapezoidal notches and broad crested weirs.

UNIT VI **Total=07hrs**

Boundary Layer Theory and Drag & Lift

Boundary layer growth in flow over a flat plate held at zero incidence- Laminar and Turbulent Boundary layers, Thicknesses of boundary layer-displacement thickness, momentum thickness and energy thickness. Boundary layer separation and control methods, Drag and lift forces-streamlined and bluff bodies-flow past immersed bodies.

TEXT BOOKS

1. "Fluid Mechanics", by Dr.A.K.Jain, Khanna Publishers.
2 "Hydraulics and Fluid Mechanics including hydraulic machines", by Modi and Seth, Standard book house Publisher.

REFERENCE BOOKS

1. "Introduction to Fluid Machines", S.K. Som& G. Biswas, Tata McGraw Hill Pvt. Ltd.

2. "Fluid Mechanics", by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi.

3. "Fluid Mechanics and Hydraulic Machines", by Subramanya, Tata McGraw Hill Pvt. Ltd.

COURSE OUTCOMES:

1) To gain the knowledge of fluid properties and measurement of pressure.
2) To compute the hydrostatic forces on plane and curved surfaces and to Identify fluid flows and draw flow net and analyse it.
3) To apply the fundamental principles of fluid mechanics to various flow problems
4) To solve the problems on boundary layer and its applications
5) Differentiate between turbulent and laminar fluid flows and also to determine the losses in pipes

A1CET203FLUID MECHANICS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	B	c	d	e	F	g	h	i	j	K
CO	√			√	√				√	√	
A1CET203FLUID MECHANICS											
Course Designed by	Department of Civil Engineering										
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015										
	Ratified by: 1st Meeting of Academic Council held on 16-04-2016										

A1CET204	SEMESTER - III	L	T	P	C
	BUILDING MATERIALS AND CONCRETE TECHNOLOGY	3	1	0	4
	Total Contact Hours – 58				
	Prerequisite : Nil				

COURSE OBJECTIVES	
1.	To understand the Properties of various Construction materials
2.	To understand the fresh and Hardened Concrete Properties
3.	To explain Mix Design and Tests on Hardened Concrete
4.	To demonstrate the need and assessment of concrete strength using NDT

SYLLABUS

Unit I (Stones, bricks, tiles, Wood and paints) **Total=12hrs**

Stones: Classification of Stones –Properties of stones in structural requirements.
Bricks: composition of good brick earth, various methods of manufacturing of bricks
Tiles: Characteristics of good tile – manufacturing methods, types of tiles.
Wood: Structure - Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber.
Paints: White washing and distempering, Constituents of paint - Types of paints - Painting of new and old wood- Varnish.

Unit II (aggregates, Cement and admixtures) **Total=12hrs**

Aggregates: Classification of aggregate, Bond, strength and other mechanical properties of aggregate, Physical Properties of aggregate, Bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali aggregate reaction – Thermal properties, Sieve analysis – Fineness modulus - Grading curves – Grading of fine and coarse aggregates as per relevant IS code, Maximum aggregate size.
Portland cement – Chemical composition, Hydration, Structure of hydrated cement – Setting of cement, Fineness of cement. Tests for physical properties – Different grades of cements.
Suplementary cementatious materials- Flyash, GGBS, Silica fume, Rice husk ash, Calcinated ash (Basic properties and their contribution to concrete strength).
Admixtures – Mineral and chemical admixtures.

Unit III (Fresh Concrete) **Total=08hrs**

Manufacture of concrete – Mixing and vibration of concrete Workability – Segregation and bleeding - Factors affecting workability, Measurement of workability by different tests, Effect of time and temperature on workability – Quality of mixing water, Ready mixed concrete, Shotcrete.

Unit IV (Hardened Concrete) **Total=10hrs**

Water / Cement ratio – Abram's Law, Gel space ratio, Nature of strength of concrete - Maturity concept, Strength in tension and compression – Properties of Hardened Concrete(Elasticity, Creep, Shrinkage, Poisson's Ratio, Water absorption, Permeabilityetc.) Relation between compression and tensile strength - Curing.

Unit V (Testing of Hardened Concrete) **Total=08hrs**

Factors effecting properties of Hardened Concrete, Compression tests, Tension tests, Flexure tests, Non-destructive testing methods – codal provisions for NDT (Rebound hammer and UPV Method).

Unit VI (MIX Design) **Total=08hrs**

Factors affecting choice of mix proportions, Durability of concrete and Quality Control of concrete, Statistical methods – Acceptance criteria – Mix design for normal strength of ordinary concrete as per IS 10262:2009 –Mix design with Fly Ash.

TEXT BOOKS:

1 "Concrete Technology", by M.S.Shetty. – S.Chand & Co.; 2004
2 "Engineering Materials", Rangwala, S.C, (36th edition),Anand Charotar Publishing House.
3 "Concrete Technology", by Shantha kumar- Oxford Publications

REFERENCE BOOKS

1. "Building Materials", S.K.Duggal, New Age International Publications.
2. "Building Materials", P.C.Verghese, PHI learning (P) Ltd., 2009.
3. "Properties of Concrete", by A.M.Neville – PEARSON – 4th edition.

COURSE OUTCOMES:

1. Ability to describe the concepts of Materials used for construction and their properties
2. Ability to determine the Fresh and Hardened concrete Properties
3. Ability to Design a concrete Mix of required grade
4. Ability to assess the concrete strength using Non-destructing testing methods.

A1CET204BUILDING MATERIALS AND CONCRETE TECHNOLOGY											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√			√	√				√	√	√

A1CET204BUILDING MATERIALS AND CONCRETE TECHNOLOGY	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council held on 16-04-2016

A1MST001	SEMESTER - III	L	T	P	C
	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	3	0	0	3

COURSE OBJECTIVES	
1	The graduate can be able to understand the principles of accounting, economics and decision making
2	The graduate shall aware various environmental factors around the business to monitor regularly.
3	The graduate can be able to visualize the different levels of sales and their implications
4	The graduate can be able to do financial analysis of the firm from different parameters through ratios.

SYLLABUS

UNIT I

Introduction to Managerial Economics & Elasticity of Demand **8 hours.**

Definition, Nature and Scope of Managerial Economics, Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Types, Measurement and Significance. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT II

Theory of Production and Cost Analysis: **8 hours**

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas production function, Laws of Returns, Economies and Diseconomies of Scale: Internal and External.

Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Book costs. Break-even Analysis (BEA) Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEA.

UNIT III

Introduction to Markets & Pricing Policies **7 hours.**

Market structures: Types of competition – Features, Perfect Competition, Monopoly, Monopolistic competition, oligopoly, Price output determination under Monopolistic.

Pricing Strategies and Methods – Cost plus pricing, Marginal cost pricing, Penetration Pricing, Price Skimming, Two part pricing, Bundle pricing, Peak load pricing, Loss leader pricing.

UNIT IV

Business & New Economic Environment **5 hours.**

Forms of Business Organizations and their features - Sole trader – Partnership – Private Ltd Public Ltd - Sources of Capital. Major factors involved in business environment – Economic – Technological – Socio Cultural – Political & Government – International.

UNIT V

Introduction to Financial Accounting **10 hours.**

Double-Entry Book Keeping, Basic Accounting terminologies, Classification of Accounts, Accounting Cycle – Journal – Ledger - Preparation of Trial Balance - Preparation of Final Accounts - Trading Account, Profit and Loss Account; Balance Sheet (simple problems).

UNIT VI

Introduction to Financial Analysis through Ratios **7 hours**

Meaning, Objectives, Need and Classification of Ratios.

Liquidity Ratios: Current ratio and Quick ratio. **Solvency Ratios:** Debt to Equity Ratio, Proprietary Ratio and Interest Coverage Ratio. **Activity Ratios:** Inventory Turnover Ratio, Debtors turnover ratio, Creditors turnover ratio, and Working Capital Turnover Ratio. **Profitability Ratios:** Gross Profit Ratio, Operating Ratio, Net Profit Ratio and Return on Investment. (Simple-Problems).

Text books:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
2. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI
3. John Dean, Managerial Economics, PHI

References:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. S.N.Maheswari & S.K. Maheswari, Financial Accounting
8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.
9. Truet and Truet: Managerial Economics: Analysis, Problems and cases ,Wiley

COURSE OUTCOMES:

i. Able to understand application of economics in decision making.
ii. Able to develop and determine cost efficient production through optimization.
iii. Able to aware various business environmental factors and the impact.
iv. Able to do financial analysis of the firm to know its performance from different parameters.

A1MST001 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS												
Course designed by	Department of Management Studies											
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k	l
i.	√			√		√	√		√		√	
ii.	√	√		√							√	
iii.				√		√	√					
iv.	√	√			√			√			√	
v.					√			√	√	√	√	
A1MST001 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS												
Course designed by	Department of Management Studies											
Approval	Approved by: Meeting of Board of Studies held on 26.12.2016											
	Ratified by: 2nd Meeting of Academic Council, 16th April 2016											

A1CEL201	SEMESTER - III	L	T	P	C
	SURVEYING LAB	0	0	3	2
	Total Contact Hours – 36				
	Prerequisite : Surveying				

COURSE OBJECTIVES	
1.	To know the process of collect field data and fill the information in field book
2.	To operate various surveying instruments
3.	To be aware of calculating areas and volumes
4.	To read the drawings/maps developed from the field data

List of Experiments:

1. Chaining across obstacles
2. Determination of distance between two inaccessible points with compass.
3. Determination of Local Attraction using compass
4. Radiation method, intersection methods by plane Table survey
5. Fly Leveling – Height of Instrument method
6. Fly Leveling – Rise and fall method
7. Measurement of Horizontal angles – using Theodolite
8. Measurement of Vertical angles – using Theodolite
9. Determination of Tacheometric Constants
10. Determination of Elevation of object using tachometry
11. Distance measurement and Traversing using Total Station
12. Contouring using Total Station
13. Introduction to GPS and Global Co-ordinate System

Design Project: Plot the topography of given area in college using Total Station

List of Equipments:

1) Metric Chain (30 m)
2) Prismatic Compass and its accessories
3) Plane Table and its accessories
4) Dumpy Level and its accessories
5) Theodolite and its accessories
6) Total Station and its accessories
7) Hand held GPS

REFERENCE BOOKS:

1."Surveying (Vol – 1, 2 & 3)" by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
2. "Surveying (Vol – 1 & 2)" by Duggal S K, Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.
3. "Surveying Vol (1, 2 & 3)" by Arrora K R, Standard Book House, Delhi, 2004

COURSE OUTCOMES:

1. Ability to operate various surveying equipments
2. Calculate areas and volumes of earthwork for various applications
3. Analyse and interpret the data collected from the field
4. To develop contour maps of the given area

A1CEL201SURVEYING LAB											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	A	B	c	d	e	F	g	h	i	J	k
CO	√	√		√							√

A1CEL201SURVEYING LAB	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2015

A1CEL202	SEMESTER - III	L	T	P	C
	FLUID MECHANICS LAB	0	0	3	2
	Total Contact Hours – 36				
	Prerequisite: Fluid Mechanics				

COURSE OBJECTIVES	
1	To understand Bernoulli's Principle and its applications through experimental investigations.
2	To study the Major and Minor losses in pipes.
3	To study the flow measuring devices through pipes, tanks and open channels.
4	To understand the type of flow in pipe using Reynolds's experiment

List of Experiments

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Verification of Bernoulli's Principle.
4. Determination of Friction Factor in a pipe.
5. Determination of loss of head due to sudden contraction, Sudden expansion, elbow, bend in a pipe.
6. Calibration of Triangular Notch.
7. Determination of Coefficient of discharge for a small orifice
8. Determination of Coefficient of discharge for an external mouth piece.
9. Verification of Reynold's Experiment.
10. Calibration of Pitot tube

List of Equipment

1) Venturimeter setup.
2) Orifice meter setup.
3) Small orifice setup.
4) External mouthpiece setup.
5) Triangular notch setup.
6) Friction factor test setup.
7) Bernoulli's theorem setup.
8) Minor Losses setup
9) Reynold's Experiment setup

REFERENCE BOOKS

1. Fluid Mechanics by Dr.AK Jain, Khanna Publishers
2. Fluid Mechanics and Hydraulic Machines: A Lab Manual by TS Desmukh, Laxmi Publications
3. Laboratory Manual on Hydraulics and Hydraulic Machines by RV Raikar, PHI Learning Ltd Publications

COURSE OUTCOMES:

1. Verify Bernoulli's Theorem and Reynolds Experiment.
2. Calculation of loss of head due to Friction (Major Loss) and Sudden Contraction (Minor Loss) in a pipeline.
3. Calculation of coefficient of discharge of flow measuring devices.
4. To demonstrate the type of flow in pipe.

A1CEL202 FLUID MECHANICS LAB											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	A	b	c	d	e	f	g	h	i	j	K
CO	√	√		√							√

A1CEL202 FLUID MECHANICS LAB	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2015

A1CET205	SEMESTER - IV	L	T	P	C
	STRENGTH OF MATERIALS –II	3	1	0	4
	Total Contact Hours – 48				
	Prerequisite : Strength of Materials-I				

COURSE OBJECTIVES	
1.	Insight into the concepts of Principal stresses and strains
2.	Understand the behaviour of columns, direct and bending stresses
3.	Insight into behaviour of unsymmetrical bending
4.	Understand the behaviour of members subjected to pure torsion

SYLLABUS

UNIT I

PRINCIPAL STRESSES AND STRAINS **Total = 08hrs**

Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

UNIT II

TORSION OF CIRCULAR SHAFTS **Total = 8hrs**

Theory of pure torsion – Derivation of Torsion equation– Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts.

UNIT III

DIRECT AND BENDING STRESSES **Total = 8hrs**

Stresses under the combined action of direct loading and B.M. - Theories of failures.

UNIT IV

SPRINGS **Total = 8hrs**

Introduction-Types of springs-Deflection of close and open coiled helical springs under axial pull and axial couple- Springs in series and parallel-Carriage or leaf springs.

UNIT V

COLUMNS AND STRUTS **Total = 8hrs**

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions-derivation of Euler's critical load- formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory.

UNIT VI

UNSYMMETRICAL BENDING & SHEAR CENTRE **Total = 8hrs**

Properties of beam cross section, slope of neutral axis, stress and deflection in unsymmetrical bending, determination of shear centre and flexural axis for I-section and Channel section. Stresses in beams subjected to unsymmetrical bending.

Text Books:

1. "Mechanics of Structures", by S. B. Junarkar and Dr. H. J. Shah, , 27th Revised and Enlarged, Charotar Publishing House, 2008
2. "Mechanics of Materials", by Gere and Timoshenko, , 4th Edition, PWS Publishing Company, May 1997.

Reference Books:

1. "Mechanics of Materials", byFerdinand BeerJr., E. Russell Johnston, John DeWolf, David
Mazurek, , 6th edition,
2. "Fundamentals of Solid Mechanics", by M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi
3. "Strength of Materials", by Ryder, Macmillan.
4. "Strength of Materials", by Pytel and Singer, Harper Collins

Course outcomes

1. Ability to apply the concepts of Principal stresses strain
2. Ability to calculate the torsion in circular shaft
3. Calculate direct and bending stresses in columns
4. Calculate stresses in beams subjected to unsymmetrical bending

A1CET205STRENGTH OF MATERIALS –II											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	B	c	d	e	f	g	h	i	j	k
CO	√				√				√		√

A1CET205STRENGTH OF MATERIALS –II	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council held on 16-04-2016

A1CET206	SEMESTER - IV	L	T	P	C
	HYDRAULICS & HYDRAULIC MACHINERY	3	1	0	4
	Total Contact Hours – 48				
	Prerequisite : Fluid Mechanics				

COURSE OBJECTIVES	
1	To enable the students to analyse and design open channels for various flow conditions.
2	To make the students understand physical relationships using methods of dimensional analysis.
3	To enable the students familiarize the general aspects related to dams and reservoirs.
4	To enable the students comprehend the working principles and design aspects of various hydraulic machines such as pumps and turbines

SYLLABUS

UNIT I (OPEN CHANNEL HYDRAULICS-I) Total =8 hrs

Channels & Flows: Type of channels – Types of flows -Velocity distribution – Energy and momentum correction factors –Uniform flow equations – Most Economical sections.

Critical flow: Specific energy- Critical depth – Computation of critical depth.

UNIT II (OPEN CHANNEL HYDRAULICS-II) Total = 8 hrs

Non uniform flow: Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method - Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT III (DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE) Total= 5hrs

Dimensional Analysis: Principle of dimensional homogeneity - Rayleigh's method and Buckingham's pi theorem

Hydraulic Similitude: Geometric, kinematic and dynamic similarities-dimensionless numbers – types of models- model and prototype relations.

UNIT IV (DAMS AND RESERVOIRS) Total = 5hrs

Hydropower plant: Layout of a typical hydropower installation – components and functions.

Dams: Dams –Classification of dams – Selection of type of dam – Selection of site for a dam.

Reservoirs: Classification of Reservoirs – Reservoir planning – Purposes of reservoirs.

UNIT V (HYDRAULIC TURBINES) Total =12hrs

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency (single and series of vanes).

Classification of hydraulic turbines - Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and functions, efficiency.

Governing of turbines- unit quantities and specific speed of turbines - performance curves.

UNIT VI (PUMPS) **Total=10hrs**

CENTRIFUGAL PUMPS: Components and working of a centrifugal pump-Classification of centrifugal pumps-work done- heads, losses and efficiencies-specific speed, pumps in series and parallel- characteristic curves- NPSH- Cavitation.

RECIPROCATING PUMPS: Components and working of a reciprocating pump, classification of reciprocating pumps, work done by reciprocating pump, slip of reciprocating pumps, indicator diagrams.

Textbooks

1. "Open Channel flow", by K. Subramanya, Tata McGraw Hill Publishers.
2. "Fluid Mechanics", by Dr.A.K.Jain, Khanna Publishers.
3. "Hydraulics and Fluid Mechanics including hydraulic machines", by Modi and Seth, Standard book house Publisher.
4. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg, Khanna Publishers.

References

1. "Fluid Mechanics and Hydraulic Machines", by Subramanya, Tata McGraw Hill Pvt. Ltd.
2. "Open Channel flow", by V T Chow, Tata McGraw Hill Publishers.
3. "Hydraulic Machines", by R K Rajput, S.Chand Limited.
4. "Introduction to Fluid Mechanics and Fluid Machines", by SK Som, Gautam Biswas, and S Chakraborty, McGraw Hill Education (India) Private Limited.

COURSE OUTCOMES:

1) Solve uniform and non-uniform flow problems
2) Apply dimensional analysis and similitude in order to account for the implications of scale in model experiments.
3) To recognize various dams and reservoirs
4) Select appropriate turbines and pumps to meet the field requirements.

A1CET206HYDRAULICS & HYDRAULIC MACHINERY											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	H	i	j	K
CO	√			√	√				√	√	

A1CET206HYDRAULICS & HYDRAULIC MACHINERY	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council held on 16-04-2016

A1CET207	SEMESTER - IV	L	T	P	C
	STRUCTURAL ANALYSIS	3	1	0	4
	Total Contact Hours – 48				
	Prerequisite : Applied Mechanics				

COURSE OBJECTIVES	
1.	Insight into the analysis of Propped cantilevers and fixed beams subjected to various loading conditions.
2.	Aware the concept of slope deflection method for analysis of continuous beams and portal frames
3.	Understand Moment Distribution and Stiffness Matrix methods.
4.	Understand the concepts of moving loads and influence lines

SYLLABUS

Unit I (Introduction & Propped Cantilever) **Total=09hrs**

Introduction to Structural Analysis, Definition and classification of structure, element/member and joint/support. Degree of static and kinematic indeterminacy. Analysis of Propped cantilever for shear, bending moment and deflection subjected to different loadings – BMD by superposition method.

Unit II (Fixed Beams) **Total=08hrs**

Analysis of fixed beams- shear, bending moment and deflection with effect of sinking of support of fixed beam subjected to point load, UDL, UVL, moment and combination of these.

Unit III (Slope-Deflection Method) **Total=08hrs**

Derivation of slope deflection equation, application to continuous beams with and without settlement of supports, non-sway portal frames with kinematic indeterminacy ≤ 2.

Unit IV (Moment Distribution Method) **Total=08hrs**

Stiffness and carry over factors –Distribution factors – Analysis of beams without sinking of supports – Portal frames – Non-Sway with degree of static indeterminacy less than or equal to three.

Unit V (Rolling Load and Influence Lines) **Total=08hrs**

Rolling load analysis for simply supported beams for several point loads and UDL. Influence line diagram for reaction, SF and BM at a given section for the cases mentioned above.

Unit VI (Stiffness Matrix Method) **Total=09hrs**

Introduction, Matrix methods, Development of stiffness matrix for plane truss element and analysis of plane truss by stiffness method with kinematic indeterminacy ≤3.

TEXT BOOKS:

1. "Analysis of Structures", by T S Thandavamoorthy, Oxford University Press, Edition 2011.
2. "Structural Analysis", by R.C. Hibbler, Pearson, New Delhi.

REFERENCES:

1. "Theory of Structures Vol. 1 and 2", by S.P. Gupta, G.S. Pandit and R. Gupta, Tata McGraw Hill Publication Company Ltd.
2. "Intermediate *Structural Analysis",* by C.K Wang, McGraw Hill Publication Company Ltd

COURSE OUTCOMES:

Upon successful completion of this course,

1. The student will be able to estimate the bending moment and shear forces in beams of different fixity conditions.
2. The student can analyze the continuous beams using method of slope deflection which impart basic concepts for other methods of analysis to be discussed in next level analysis course.
3. The student will be able to analyze the rolling load and influence lines for beams under different loading conditions.
4. The student will be able to analyze structures using Moment Distribution and Matrix methods

A1CET207STRUCTURAL ANALYSIS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√				√						√

A1CET207STRUCTURAL ANALYSIS	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

A1CED208	SEMESTER - IV	L	T	P	C
	BUILDING PLANNING & CIVIL ENGINEERING DRAWING	1	0	3	4
	Total Contact Hours – 48				
	Prerequisite : Engineering Drawing				

COURSE OBJECTIVES	
1.	Impart the knowledge of Bye-laws, Principles & Objectives of building Planning.
2.	Impart the knowledge of functional planning and designing of residential and public buildings.
3.	Understand structural drawings of RC buildings, Industrial structures and Pipe line drawings

SYLLABUS

UNIT I (Building Bye-laws and Regulations) **Total = 6hrs**

Introduction, terminology. Objectives of building bye-laws, Principles under laying building bye laws. Classification of buildings, Open space requirements. Floor area ratio, Floor space index, built up area limitations. Lighting and ventilation requirements.

UNIT II(Planning of Buildings) **Total = 10hrs**

Development Control Rules and General Building Requirements as per NBC

Residential Buildings -Introduction, minimum standards for various parts of buildings. Requirements of different rooms and their grouping. Characteristics of various types of residential buildings.

Public Buildings - Introduction-Planning of educational institutions. Planning of Hospital buildings. Planning of Office buildings.

UNIT III (Conventional Signs and Bonds) **Total = 8hrs**

Conventional signs–Brick, Plaster, Stone, Plain Cement Concrete, Reinforced Cement Concrete, Timber, Glass, Sand filling, Steel, Cast iron, Copper alloys, Aluminum alloys etc..

Bonds- Introduction, Terminology, Types of Bonds, English bond and Flemish bond –Odd and Even courses for one, one and half, two brick walls in thickness at junction of a corner.

UNIT IV (Drawing of Flat roofed buildings) **Total = 8hrs**

Draw a Plan, Elevation and Sectional view of a Residential and Public buildings from the given line diagram, Plot area and Plinth area.

UNIT V (Sloped roofed buildings) **Total=8hrs**

Introduction to Sloped roofed buildings-Couple roof, Collar roof, and Different types of trusses- Planning and preparing sketches and working drawings of single storey factory buildings with trusses

UNIT VI (Interpretation of Drawings): **Total=8hrs**

R.C. Structural drawings (Slabs, Beams, Columns &Footings), Industrial drawings (Steel truss structures, Simple steel framed structures), Pipe network drawings (Water supply)

Drawing Practice:
At least five sheets shall be drawn during the semester manually using mini- drafter or set squares

1. Conventional signs of materials
2. Different bonds in masonry construction

Plan, Sectional Elevation, Front Elevation for the following

3. Two BHK house
4. RCC sloped roof structure
5. Simple Truss Structure

TEXT BOOKS

1. "Building Planning and Drawing", by N.Kumara swamy and A.Kameswara rao, Charotar Publishing House Pvt. Ltd.
2. "Building Planning Designing and Scheduling", by Gurucharan singh & Jagdish singh, Standard Publishers Distributors

REFERENCE BOOKS

1. "Drawing and Design of Residential and commercial Building", by Zaidi S. Kaleem A. Label BookPublisher: New Delhi Standard Pub.
2. "Civil engineering drawing and design", by Ghose, CBS Publisher.

COURSE OUTCOMES

1.Ability to prepare plan the structure satisfying all the building Bye-laws and General Building Requirements as per NBC
2. Ability to use different conventional signs in drawing plans of structures
3. Ability to read and interpret the given RCC, Industrial and Pipeline drawings.

A1CED208BUILDING PLANNING & CIVIL ENGINEERING DRAWING											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	A	b	c	d	e	F	g	h	i	j	k
CO	√			√							√

A1CED208BUILDING PLANNING & CIVIL ENGINEERING DRAWING	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

A1CET301	SEMESTER - IV(Core Elective-I)	L	T	P	C
	ADVANCED SURVEYING	3	0	0	3
	Total Contact Hours – 48				
	Prerequisite : Surveying				

COURSE OBJECTIVES	
1.	To understand the concepts of geodetic surveying and to know the errors in surveying
2.	To understand filed astronomy and aerial Photogrammetry
3.	To be exposed to various modern surveying equipment.
4.	To understand the fundamentals of Global Positioning System.

SYLLABUS

UNIT I (Geodetic Surveying) **Total = 8hrs**

Principle and Classification of triangulation system- Selection of base line and stations- Orders of triangulation- Triangulation figures- Station marks and signals- marking signals- Extension of base, Reduction of Centre, Selection and marking of stations, satellite station.

UNIT II (Theory of Errors) **Total = 8hrs**

Introduction, types of errors, definitions, laws of accidental errors, laws of weights, theory of least squares, rules for giving weights and distribution of errors to the field observations, determination of the most probable values of quantities.

UNIT III (Field Astronomy) **Total = 8hrs**

Introduction, purpose, astronomical terms, determination of azimuth, latitude and longitude

UNIT IV (Satellite Photogrammetry) **Total = 8hrs**

Introduction, Principle, Uses, Aerial camera, satellite photographs, Definitions, Scale of vertical and tilted photograph,, Ground Co-ordinates, Displacements and errors, Ground control, Procedure of aerial survey, Photomaps and mosaics, Stereoscopes, Parallax bar- Drones survey

UNIT V (Modern Surveying Equipment) **Total = 8hrs**

Modern surveying electronic equipments: digital levels, digital theodolites, EDMs, Total stations; Principles, working and applications; Lasers in surveying.

UNIT VI (GPS and Navigation) **Total = 8hrs**

Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture. GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinates, World Geodetic System 1984 (WGS 84).

Textbooks :

1. "Advanced surveying" , by R.Agor, Khanna Publishers
2. "Advanced surveying Total Station, GIS & Remote Sensing", by Satheesh Gopi, R. Sathi kumar, N.Madhu, Pearson Publishers

Reference Books:

1. "Higher Surveying", by Chandra, A.M. (2002) New Age International Publishers
2. "Surveying", by Bannister, A., Raymond, S., Baker, R., (2006) Pearson Education
3. "Fundamentals of GPS receivers – A software approach", by James Ba – Yen Tsui, John Wiley & Sons (2001).

COURSE OUTCOMES:

1. Able to conduct different types of surveys
2. Ability to calculate various types of errors occurred during survey and apply corrections to them
3. Able to utilize the total stations for getting the required information
4. Capability to use the GPS instrument to obtain appropriate information of the objects and their positions

A1CET301ADVANCED SURVEYING											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	E	f	g	h	i	j	K
CO	√			√	√				√	√	

A1CET301ADVANCED SURVEYING	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

AICET302	SEMESTER - IV(Core Elective-I)	L	T	P	C
	ADVANCED CONCRETE TECHNOLOGY	3	0	0	3
	Total Contact Hours – 48				
	Prerequisite : Concrete Technology, Physics and Chemistry				

COURSE OBJECTIVES	
1.	To understand the behavior of new materials used in making of concrete
2.	To be exposed various new concretes and their mechanical behavior
4.	To understand various Non-Destructive Techniques to assess the quality of Hardened or in-situ Concrete elements

SYLLABUS

UNIT I (Latest Materials) **Total=09hrs**

Latest Materials in Concrete technology: Scarcity, sustainability, carbon foot prints, pros and cons of alternate materials - Rate analysis of using new materials, recycling and reuse. Different Types of Materials- Properties effecting materials- Chemical Reaction with other Materials-Admixtures.

UNIT II (Special Concretes 1) **Total=08hrs**

Fiber reinforced concrete, Properties of constituent materials - Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete, Applications of fiber reinforced concretes, Light weight concrete, Properties of light weight concrete, Design of light weight concrete, No fines concrete- Flyash concrete , classification of Flyash, properties and reaction mechanism of Flyash concrete.

UNIT III (Special Concretes 2) **Total=08hrs**

High performance concretes- Introduction, Development of high performance Concretes, Materials, Properties of high performance concretes, Self Consolidating concrete, Porous concrete.

UNIT IV (Mix Design Consideration) **Total=08hrs**

Design Consideration of mix Design using IS Code, American Code, British Code, Factors Effecting the RMC, Properties of RMC, Design for Ready mix Concrete.

UNIT V (Admixtures, Durability of concrete) **Total = 08 hrs**

Admixtures – Durability aspects of concrete: Shrinkage, Alkali testing and its attack, Issues with cement, fineness of cement and relative content of fly ash.

UNIT VI (Non destructive evaluation) **Total=08hrs**

Importance- Concrete behaviour under corrosion, Disintegrated mechanisms, Moisture effects and thermal effects, Visual investigation- Acoustical emission methods-, Corrosion activity measurement- chloride content.

TEXT BOOKS:

1. “Properties of Concrete”, by Neville, Prentice Hall, Newyork
2. R. Santhakumar ‘ Concrete Technology’, Oxford University Press

REFERENCES

1. “Concrete technology”, by Neville & Brooks, Prentice Hall, Newyork
2. “Concrete technology”, by M S Shetty, S.Chand publisher.
3. “Advanced Concrete Technology”, by John Newman and Ban Seng Choo Butterworth-Heinemann Ltd.
4. “Concrete repair and maintenance illustrated”, by Peter H Emmons,John Wiley & Sons.

OUTCOMES:

1. Ability to analyse various materials available for making concrete
2. Ability to do Mix design for given grade as per different codes of practice.
3. Ability to identify the suitable admixture for the given application
4. Ability to assess the strength of concrete using suitable NDT.

A1CET302ADVANCED CONCRETE TECHNOLOGY											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√		√						√	√	

A1CET302ADVANCED CONCRETE TECHNOLOGY	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

AICET303	SEMESTER - IV(Core Elective-I)	L	T	P	C
	ENGINEERING GEOLOGY	3	0	0	3
	Total Contact Hours – 48				
	Prerequisite :				
COURSE OBJECTIVES					
1.	Understand the properties of geological minerals and rocks				
2.	Understand various formations of rocks and their properties				
3.	To read and comprehend engineering geological maps				

SYLLABUS

UNIT I **Total = 6hrs**

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT II **Total = 10hrs**

Mineralogy and Petrology: Definitions of mineral and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz, Olivine, Augite, Hornblende, Micas, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnesite and Bauxite. Classification, structures ,textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate, Charnockite.

UNIT III **Total = 8hrs**

Structural Geology: Strike , Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types and their importance in Civil Engineering.

UNIT IV **Total = 8hrs**

Ground Water: Water table, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Magnitude and intensity, Seismic waves, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken to prevent their occurrence at Landslides.

UNIT V **Total = 8hrs**

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods (solve numerical), Seismic methods, Radiometric method, Electrical resistivity, and Seismic refraction methods. Applications in Civil Engineering.

UNIT VI **Total = 8hrs**

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs.

Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

TEXT BOOKS:

1. "Engineering Geology", by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
2. "Engineering Geology", by N. Chenn kesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
3. "Engineering Geology", by K V S G Gokhale

REFERENCE BOOKS:

1. "Engineering Geology for Civil Engineers", by P.C. Varghese, PHI learning pvt. Ltd.
2. "Geology for Engineers and Environmental Society", by Alan E Kehew, person publications, 3rd edition
3. "Fundamentals of Engineering Geology", by P.G.Bell, B.S.P. Publications, 2012.
4. "Engineering Geology", by V.Parthesarathi et al., Wiley Publications
5. "Environmental Geology", by K.S.Valdiya, McGraw Hill Publications, 2nd ed.

COURSE OUTCOMES:

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

1. Identify and classify the geological minerals and rocks
2. Identify the properties of various rocks
3. Prepare, analyse and interpret the Engineering Geologic maps
4. Test the geological material and ground to check the suitability of civil engineering project construction.

A1CET303	ENGINEERING GEOLOGY										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√			√	√						√

A1CET303	ENGINEERING GEOLOGY
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

A1CEL203	SEMESTER - IV	L	T	P	C
	STRENGTH OF MATERIALS LAB	0	0	3	2
	Total Contact Hours – 36				
	Prerequisite : Engineering Mechanics, Strength of Materials				

COURSE OBJECTIVES	
1.	To verify basic principles of mechanics
2.	To understand, methods available for determining physical properties of materials
3.	To understand young's modulus of various materials

SYLLABUS

List of Experiments:

1. Tension test on Mild steel and HYSD bars.
2. Compression test on Concrete , wooden block or Brick
3. Hardness test on metal sample
4. Verification of Maxwell's Reciprocal theorem on beams
5. Impact test on Mild steel sample
6. Shear test on metal sample
7. Bending test on metal sample
8. Spring test (open and close coiled)
9. Deflection test on continuous beam
10. Determination of Young's Modulus of Concrete
11. Theoretical demonstration on short peening for stress removal
12. Design Experiment

List of Equipment:

1. Universal Testing Machine
2. Compression Testing Machine
3. Impact Testing Machine
4. Hardness Testing Machine
5. Test Setup for Simply supported and Cantilever beams

TEXT BOOKS

1. "Testing of Engineering Materials, Davis, Troxell and Hawk, International Student Edition – McGraw Hill Book Co. New Delhi.
2. "Mechanical Testing of Materials", Fenner, George Newnes Ltd. London.

REFERENCE BOOKS

1. "Experimental Strength of Materials", Holes K A, English Universities Press Ltd. London.
2. "Testing of Metallic Materials", Suryanarayana A K, Prentice Hall of India Pvt. Ltd. New Delhi.
3. Relevant IS Codes
4. "Material Testing Laboratory Manual", Kukreja C B- Kishore K. Ravi Chawla Standard Publishers & Distributors 1996.

COURSE OUTCOMES:

1. Determine various mechanical properties of steel
2. Calculate the hardness of the given steel specimen
3. Determine the stiffness and deflection of the given spring material
4. Compute the toughness of given steel specimen

A1CEL203STRENGTH OF MATERIALS LABORATORY											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√	√									√

A1CEL203STRENGTH OF MATERIALS LABORATORY	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

A1CEL204	SEMESTER - IV	L	T	P	C
	HYDRAULIC MACHINERY LAB	0	0	3	2
	Total Contact Hours – 48				
	Prerequisite: Fluid Mechanics, Hydraulic Machines				

	COURSE OBJECTIVES
1	To study the impact of jets.
2	To study the components, working principle, functions and performance of Pelton Wheel, Francis and Kaplan Turbines.
3	To study the components, working principle, functions and performance of Reciprocating and Centrifugal Pumps.
4	To study the phenomenon of Hydraulic Jump.

List of Experiments

1. Determination of coefficient of Impact of Jet on Vanes
2. Performance test on Pelton Wheel
3. Performance test on Francis Turbine.
4. Performance test on Kaplan Turbine.
5. Performance test on Single Stage Centrifugal Pump.
6. Performance test on Multi Stage Centrifugal Pump.
7. Performance test on Reciprocating Pump.
8. Study of Hydraulic Jump.
9. Demonstration on submersible pumps
10. Design Experiment

List of Equipment

1. Impact of jet experimental setup.
2. Hydraulic jump test setup.
3. Pelton Wheel test rig
4. Francis turbine test rig
5. Kaplan turbine test rig
6. Single stage Centrifugal pump test rig
7. Multi stage Centrifugal pump test rig
8. Reciprocating pump test rig

TEXT BOOKS

1. "Sarbjit Singh, Experiments in Fluid Mechanics", PHI Publications.
2. "Experiments in Fluid Mechanics", by Kapoor .B.S, Khanna Publishers.
3. "Fluid Mechanics including Hydraulic Machines", by Dr AK Jain, Khanna Publishers.
4. "Hydraulics and Fluid Mechanics including Hydraulic Machines", by Dr PN Modi and Dr SM Seth, Standard Book House.

REFERENCE

1. "Fluid Mechanics in SI Units", by Yunus A Cengel and John M Cimbala, McGraw Hill Education (India) Private Limited.
2. "Fluid Mechanics", by Frank M White, McGraw Hill Education (India) Private Limited.

COURSE OUTCOMES:

1. Calculation of Impact of Jet on vanes.
2. Determine the Efficiency and Performance Curves for Kaplan, Francis and Pelton turbines
3. Determine the Efficiency and Performance Curves of Reciprocating and Centrifugal pumps
4. Determine the flow characteristics of hydraulic jump

A1CEL204HYDRAULIC MACHINERY LAB											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO	√	√		√							√

A1CEL204HYDRAULIC MACHINERY LAB	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 09-12-2015
	Ratified by: 1st Meeting of Academic Council, held on 16-04-2016

A1CET209	SEMESTER-V	L	T	P	C
	WATER RESOURCES ENGINEERING	3	1	0	4
	Total Contact Hours – 48 (L) + 16(T)				
	Prerequisite : Fluid Mechanics,Mathematical Methods				

COURSE OBJECTIVES	
1	To teach physical processes in hydrology, measurement and estimation of various components of hydrologic cycle
2	To provide an overview of Unit Hydrograph theory and its analysis and flood routing
3	To explain the concepts of groundwater movement and well hydraulics.
4	To outline the concepts of planning and design of irrigation systems.

SYLLABUS

UNIT-I **Total = 8hrs**

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, rain-gauge network, presentation of rainfall data, computation of average rainfall, continuity and consistency of rainfall data using Double mass curve technique, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT-II **Total=8hrs**

Abstractions from Precipitation: Initial abstractions.

Evaporation: factors affecting, measurement, reduction

Evapotranspiration: factors affecting, measurement, control

Infiltration: factors affecting, Horton's Infiltration capacity curve, measurement, infiltration indices.

UNIT-III **Total = 8hrs**

Runoff: Catchment characteristics**,** Factors affecting runoff, components, computation-empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT-IV **Total = 8hrs**

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (PMF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing, Muskingum and Puls methods of routing.

UNIT-V **Total =8hrs**

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of an open well-recuperation test.

UNIT VI **Total=8hrs**

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, estimation of consumptive use, crop water requirements- duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

TEXT BOOKS:

1.'Engineering Hydrology' by Subramanya, K, Tata McGraw-Hill Pvt. Ltd, New Delhi.
2. 'Element Hydrology by V.P.Singh, Pearson Higher Education publishers
3. 'Irrigation and Hydraulic Structures' by S K Garg, Khanna Publishers.

REFERENCE BOOKS:

1. 'Water Resources Engineering', Mays L.W, Wiley India Pvt. Ltd, (2013).
2. 'Hydrology' by Raghunath. H.M., New Age International Publishers, (2010).
3. 'Applied Hydrology' by Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

OUTCOMES

upon the successful completion of this course, the student is expected to

- Estimate various components of hydrologic cycle
- Apply Unit Hydrograph for finding direct runoff hydrograph
- Solve well hydraulics problems
- Identify the parameters required for planning and design of irrigation systems.

A1CET209	**WATER RESOURCES ENGINEERING**										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√			√	√		√
CO-2	√				√			√	√		√
CO-3	√				√			√	√		√
CO-4	√				√			√	√		√
A1CET209	**WATER RESOURCES ENGINEERING**										
Course Designed by	Department of Civil Engineering										
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017										
	Ratified by: Meeting of Academic Council held on										

A1CET210	SEMESTER-V	L	T	P	C
	DESIGN OF REINFORCED CONCRETE STRUCTURES	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite : Structural Analysis, Strength of Materials				

COURSE OBJECTIVES	
1.	Demonstrate the general mechanical behaviour of reinforced concrete by working stress and Limit State Design.
2.	Explain analysis and design of reinforced concrete beams for flexural, Shear, Torsion.
3.	Explain analysis and design of reinforced concrete columns, slabs and Isolated Foundations
4.	Outline the concept of Bond, Anchorage, Development and Serviceability

SYLLABUS

UNIT- I (Introduction) **Total=10hrs**

Materials for reinforced concrete, loading standards – Dead, live, wind and earthquake loads - Philosophy of working stress method, ultimate load method and limit state method. Concepts of limit state design – Basic statistical principles – Characteristic loads –Characteristic strength – Partial load and safety factors. Stress blocks of limit state method, neutral axis depth, moment of resistance, balanced, under-reinforced and over-reinforced sections (Theoretical concepts).

UNIT - II (Limit State Design for flexure) **Total=8hrs**

Design for flexure: IS 456 code provisions of flexural members **-** Limit State Analysis and design of singly reinforced rectangular and T-beams, doubly reinforced rectangular beams, Serviceability aspects in design of beams.

UNIT- III (Limit State Design for Shear, Torsion, Bond & Anchorage)Total=8 hrs Limit state analysis and design of section for shear and torsion IS 456 code provisions. Design examples in simply supported beams. Concept of bond, anchorage and development length.

UNIT- IV (Limit State Design of Slabs) **Total=8hrs**

Classification of slabs, design and detailing of one way slabs, Serviceability aspects in design of slabs

UNIT -V (Limit State Design of Compression Members) **Total=7hrs**

Effective length of a column- analysis, design and detailing of short under axial loads and uniaxial bending using IS Code provisions and SP16 Charts**.**

UNIT- VI (Limit State Design of Footing) **Total=7hrs**

Different types of footings – Design and Detailing of isolated footings – rectangular and square footings subjected to axial loads and uni-axial bending moments.

TEXT BOOKS:

1. Limit State Design of Reinforced Concrete, Varghese, P.C., Prentice Hall of India, Pvt. Ltd., New Delhi, 2002.
2. Design of Reinforced Concrete Structures by Subramanian, N, Oxford University Press, New Delhi, 2013.
3. Reinforced Concrete Limit State design AK Jain , Publisher: Nem Chand & Brothers

REFERENCE BOOKS:

1. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill,3rd Edition, 2005.
2. Reinforced Concrete Structures by Park and Pauley, John Wiley and Sons.
3. Reinforced concrete design by S. Unnikrishnan Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
4. IS 456-2000, SP 16-1978.

OUTCOMES:

Upon successful completion of the course, the student is expected to

1. Apply the fundamental concepts of working stress method and limit state method for design of RC Elements
2. Use IS code of practice for the design of reinforced concrete elements.
3. Design and detail of beams, slabs, columns and footings etc. made with RC
4. Use the concept of limit state of flexure, concept of Bond, Anchorage, Development and Serviceability.

A1CET210	**DESIGN OF REINFORCED CONCRETE STRUCTURES**										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√				√		√
CO-2	√		√		√				√		√
CO-3	√		√		√				√		√
CO-4	√		√		√				√		√

A1CET210	**DESIGN OF REINFORCED CONCRETE STRUCTURES**
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017 Ratified by: Meeting of Academic Council, held on

A1CET211	SEMESTER-V	L	T	P	C
	TRANSPORTATION ENGINEERING	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite: None.				

COURSE OBJECTIVES	
1.	To explain how various road elements are designed.
2.	To demonstrate how to collect and present traffic engineering data and design various road safety instruments.
3.	To teach the design elements of flexible and rigid pavements.
4.	To explain the construction and maintenance procedures of various types of roads.

SYLLABUS

UNIT - I (Highway Development and Planning) **Total=08hrs**

Highway development in India, Necessity for Highway Planning, Different Road Development Plans, Classification of Roads, Road Network Patterns, Planning Surveys, Highway Alignment and factors affecting Alignment, Engineering Surveys, Drawings and Reports.

UNIT- II (Highway Geometric Design) **Total=08hrs**

Importance of Geometric Design**,** Design controls and Criteria**,** Highway Cross Section Elements**,** Sight Distance Elements-SSD, OSD &ISD, Design of Horizontal Alignment: Super elevation, Extra widening, Transition Curves, Design of Vertical alignment, Gradients, Vertical curves.

UNIT- III (Highway Materials) **Total=08hrs**

Subgrade soil: classification by group index method (HRB), Subgrade soil strength: California bearing ratio, modulus of subgrade reaction. Bituminous materials: types & desirable properties, Tests on bitumen, Tests on Aggregates, Bituminous paving mixes: Marshall method of mix design. Construction of earth roads, gravel roads and water bound macadam roads**.**

UNIT- IV (Design of Flexible Pavements) **Total=08hrs**

Objectives & Requirements of pavements, Types of Pavements**,** Functions of pavement components**,** Design factors, Flexible Pavement Design Methods: CBR method, IRC method, Burmister method, Mechanistic method, IRC Method for low volume flexible pavements, Construction of bituminous pavements.

UNIT- V (Design of Rigid Pavements) **Total=08hrs**

Design Considerations: wheel load stresses, temperature stresses, frictional stresses, combination of stresses, Design of slabs, Design of joints, IRC method, Rigid pavements for low volume roads, Continuously reinforced cement concrete pavements, Roller compacted concrete pavements, Construction of cement concrete pavements.

UNIT- VI (Traffic Engineering) **Total=08hrs**

Introduction**,** Traffic Characteristics, Traffic Operations, Traffic Studies: Surveys, Data collection, Data Analysis and Data interpretation, Design of Intersections, Design of Parking Facilities, Accident Studies, Traffic Planning and Administration.

TEXT BOOKS

1. Khanna S.K., And Justo C.E.G - Highway Engineering – Nem Chand Bros., Roorkee.
2. MORTH Publications - Specifications for Roads and Bridges - Manual for Maintenance of roads.
3. Kadiyali LR, Principles of Highway Engineering; Khanna Publishers, New Delhi.

REFERENCE BOOKS

1. Papacostas C.S. - Fundamentals of Transportation Engineering - Prentice Hall of India Pvt.Ltd; New Delhi.
2. Nicholas J. Garber, Lester A. Hoel, Traffic and Highway Engineering., Cengage Learning.
3. IRC SP- 019: Manual for Survey, Investigation and Preparation of Road Projects.
4. IRC 067: Code of Practice for Road Signs (Third Revision).
5. IRC 093: Guidelines on Design and Installation of Road Traffic Signals.
6. IRC SP 088: Manual on Road Safety Audit
7. IRC 053: Road Accident Recording Forms A-1 and A-4 (Second Revision)

OUTCOMES:

Upon successful completion of the course, the student is expected to

1. Know how various road elements are designed.
2. Collect and present traffic engineering data and design various road safety instruments.
3. Design elements of flexible and rigid pavements.
4. Know how to construct and maintain various types of roads.

A1CET211	TRANSPORTATION ENGINEERING										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√					√	√
CO-2	√		√		√					√	√
CO-3	√		√		√					√	√
CO-4	√		√		√					√	√

A1CET211	TRANSPORTATION ENGINEERING
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET212	SEMESTER-V	L	T	P	C
	GEOTECHNICAL ENGINEERING	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite: None.				

COURSE OBJECTIVES	
1.	To impart knowledge to the student about phase diagrams and soil structure.
2.	To explain the student as to how to classify the soils based on Atterberg limits and particle size distribution
3.	To impart the concept of permeability and estimation of seepage discharge
4.	To explain the student about the principles of compaction, consolidation and shear strength of soils and their application to field problems

SYLLABUS

UNIT- I (Introduction) **Total=7hrs**

Soil formation – Types of soils in India and World- Index properties- grain and aggregate properties- Size and shape of particles- Soil structure and its importance –Relative density- Mass volume relationship - clay mineralogy – Adsorbed water.

UNIT- II (Classification of Soils) **Total=8hrs**

Mechanical analysis- Atterberg Limits and related indices- soil classification and its significance-Unified soil classification and IS classification based on mechanical analysis and Atterberg limits- Engineering use chart and its significance.

UNIT- III (Permeability) **Total=8hrs**

Darcy's law- flow through tubes of various cross sections- permeability and its physical significance- Factors affecting the coefficient of permeability –Permeability of layered systems - Total, neutral and effective stresses –quick sand condition- Laplace's equation - Seepage through soils –Flow nets: Characteristics and Uses. Soil moisture and capillary phenomena.

UNIT- IV (Compaction) **Total=5hrs**

Significance – factors affecting– effect of compaction on mechanical properties of soil- Mechanism of compaction - compaction control

UNIT- V (Vertical Stress Distribution in Soil and consolidation) **Total=12hrs**

Geostatic stresses- stresses induced by applied loads point loads and areas of different shapes - Boussinesq's and Westergaard's theories - Newark's influence chart – 2:1 stress distribution method.

Consolidation: Significance of consolidation – stress-strain- time relationship for sand and clay- e-p and e-log p curves – Stress story- Over consolidated and normally consolidated clays– Mechanism of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (C_V) - secondary consolidation

UNIT- VI (Shear Strength of Soils) **Total=8hrs**

Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behaviour of Sands - Critical Void Ratio – Stress-Strain behaviour of clays – Shear Strength determination- various drainage conditions.

TEXT BOOKS:

1. 'Basic and Applied Soil Mechanics' by Gopal Ranjan and A.S.R. Rao, New Age International Publishers.
2. 'Fundamentals of Soil Mechanics' by D.W. Taylor, Wiley.
3. **'**An introduction to Soil mechanics and foundations' by C.R.Scott, Springer-Science.

REFERENCE BOOKS:

1. An Introduction to Geotechnical Engineering by Holtz and Kovacs; Prentice Hall.
2. Soil Mechanics in Engineering Practice by Terzaghi and Peck, Wiley International Edition.
3. Soil Mechanics by Lambe and Whitman, John Wiley & Sons.

OUTCOMES:

At the end of the course, the student is expected to

1. Explain as to how to classify the soils
2. Determine the seepage discharge based on flow net
3. Determine the increase in stresses in soils, settlement and rate of settlement consequent to construction activity
4. Determine the cohesion and internal friction of different soils under different drainage conditions based on the data given

A1CET212	GEOTECHNICAL ENGINEERING										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	F	g	H	i	j	k
CO-1	√			√	√				√		√
CO-2	√			√	√				√		√
CO-3	√			√	√				√		√
CO-4	√			√	√				√		√

A1CET212	GEOTECHNICAL ENGINEERING
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET213	SEMESTER-V	L	T	P	C
	ENVIRONMENTAL ENGINEERING - I	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite : Fluid Mechanics				

COURSE OBJECTIVES	
1	Outline planning and the design of water supply systems for a community/town/city.
2	Provide knowledge of water quality requirement for domestic usage
3	Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4	Impart knowledge on Selection of valves, fixtures and design of water distribution network.

SYLLABUS

UNIT I (Quantity of Water) **Total=08hrs**

Protected water supply-Introduction–Population forecasts, design period – water demand – factors affecting – fluctuations – fire demand- quantitative requirements of water for various needs.

Unit II (Sources & Quality of water) **Total=08hrs**

Physical, chemical and biological characteristics of water –Sampling & Analysis - IS and WHO Standards- Sources of water -qualitative studies. Intakes– infiltration galleries-Yield tests.

Unit III (Water Treatment I) **Total=08hrs**

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation – coagulants – Determination of Coagulant dosage feeding arrangements; Design of Plain sedimentation tank and Clarifier.

Unit IV (Water Treatment II) **Total=08hrs**

Filtration: Theories of Filtration– working of slow and rapid gravity filters – Comparison-design of rapid sand filter – troubles in operation of filters.
Disinfection – Theory of chlorination, chlorine demand and other disinfection practices.
Special treatment Methods: Adsorption; Fluoridation- De-Fluoridation, Ultra Filtration, Silica Gel, Activated carbonation.

Unit V (Water Distribution Systems) **Total=08hrs**

Distribution systems – requirements – methods and layouts -service reservoir-Mass curve method–Pipes- Materials - laying- joining testing - pipe appurtenances- Pumps and pumping stations.

Unit VI (Analysis of Distribution systems) **Total=08hrs**

Analysis of Distribution systems - Hardy Cross, Newton-Raphson and equivalent pipe methods-Design Aspects of Distribution systems- Application of Software's on water distribution.

TEXT BOOKS:

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, George Tchobanoglous – McGraw-Hill Book Company, New Delhi, 1985.
2. Water and Wastewater Technology by M Davis, Tata McGraw Hill Ltd, New Delhi.
3. Water Supply Engineering by S.K. Garg, Khanna Publications.

REFERENCE BOOKS:

1. CPHEEO Manual on Water Supply Engineering, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000.
2. Physico chemical processes for water quality control by Weber, J, JohnWiley and sons, NewYork, 1983.
3. Water and Wastewater Technology by Mark J Hammar, Prentice Hall.
4. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

OUTCOMES:

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

1. Plan and design the water and distribution networks and sewerage systems.
2. Identify the water source and select proper intake structure.
3. Characterize the quality of water and select a suitable treatment for raw water.
4. Select the appropriate appurtenances in the water supply.

A1CET213	ENVIRONMENTAL ENGINEERING-I										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√				√		√
CO-2	√				√				√		√
CO-3	√				√				√		√
CO-4	√				√				√		√

A1CET213 ENVIRONMENTAL ENGINEERING-I	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CEL205	SEMESTER-V	L	T	P	C
	CONCRETE TECHNOLOGY LAB	0	0	3	2
	Total Contact Hours – 48				
	Prerequisite : Concrete Technology				

COURSE OBJECTIVES	
1.	To explain how to effectively link theory with practice related to concrete technology
2.	To demonstrate experiments on cement, fine aggregate, coarse aggregate, concrete and corresponding equipment and machines
3.	To explain how to analyse data after conducting experiments and how to apply to filed conditions.
4.	To emphasize the knowledge and application of safety measures

SYLLABUS

LIST OF EXPERIMENTS

TESTS ON CEMENT

1. Determination of Fineness of cement(Sieving method)
2. Determination of Specific gravity of cement
3. Determination of Normal Consistency of cement
4. Determination of Initial and Final setting time of cement
5. Determination of Soundness of cement
6. Determination of Compressive strength of cement
7. Determination of Specific Surface area of cement

TESTS ON FINE AGGREGATE

1. Determination of Specific Gravity of Fine Aggregate
2. Determination of Bulking of Fine Aggregate
3. Determination of Fineness Modulus & Zone of Fine Aggregate

TESTS ON COURSE AGGREGATE

1. Determination of Bulk Density and Void ratio of Coarse Aggregate
2. Determination of Specific Gravity of Coarse Aggregate
3. Determination of Water Absorption of Coarse Aggregate
4. Determination of Fineness Modulus of Coarse Aggregate
5. Determination of Flakiness index of Coarse Aggregate
6. Determination of Elongation index of Coarse Aggregate

TESTS ON FRESH CONCRETE

1. Determination of Workability of Fresh Concrete By Slump Test
2. Determination of Workability of Fresh Concrete By Compacting Factor Test
3. Determination of Workability of Fresh Concrete By VEE-BEE Consistometer Test

DESTRUCTIVE TESTS ON HARDENED CONCRETE

1. Determination of Compressive strength of Concrete
2. Determination of Split Tensile strength of Concrete
3. Determination of Flexural strength of Concrete

NON-DESTRUCTIVE TESTS ON HARDENED CONCRETE

1. Working with Rebound Hammer instrument
2. Working with Pulse Velocity instrument

REFERENCE BOOKS

1. Relevant IS codes (http://www.bis.org.in/)
2. Concrete Technology by AR Santha kumar- Oxford Publications
3. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004

COURSE OUTCOMES:

After successful completion of this course, the student is expected to

1. Determine properties of concrete making materials
2. Determine fresh and hardened properties of concrete
3. Work with NDT equipment
4. Know safety measures for operating equipments in concrete technology lab

A1CEL205	CONCRETE TECHNOLOGY LAB										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√	√		√							√
CO-2	√	√		√							√
CO-3	√	√		√							√
CO-4	√	√		√							√

A1CEL205	CONCRETE TECHNOLOGY LAB
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CEL206	SEMESTER-V	L	T	P	C
	ENGINEERING GEOLOGY LAB	0	0	3	2
	Total Contact Hours – 48				
	Prerequisite : None				

COURSE OBJECTIVES	
1.	To demonstrate Mega-scopic identification of Rock forming and Ore minerals
2.	To demonstrate Mega-scopic identification of Igneous, Sedimentary, and Metamorphic rocks
3.	To explain the topographical study of the site
4	To explain how to solve structural geology problems

SYLLABUS:

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
   a. Rock forming minerals – Quartz, Agate, Feldspar (Orthoclase, Microclime), Garnet group, Mica group (Muscovite and Biotite), Talc, Chlorite, Olivine, Kyanite, Sillimanite, Asbestos, Corrundum, Tourmelene, Calcite, Gypsum, Apatite, etc.
   b. Ore forming minerals – Magnetite, Hematite, Chalcopyrite, Pyrolusite, Graphite, Chromite, Coal etc…
2. Megascopic description and identification of rocks.
   a) Igneous rocks –Granite, Pegmatite, Gabbro, Dolerite, Granite Poryphery, Basalt, etc…
   b) Sedimentary rocks – Sandstone, Rajamandry sandstone, Limestone, Shale, Laterite, Conglamorate, etc…
   c) Metamorphic rocks –Granite Gneiss, Slate, Biotiteschist, Marble, Khondalite, Charnockite etc.
3. Interpretation and drawing of sections for topographic maps and geological maps showing tilted beds, faults, unconformities etc.
4. Simple thickness, width, strike, dip and geometrical Structural Geology problems.
5. Core cutting methods, Lithologs- Borehole data problems
6. Hydrogeological survey (Well inventory)

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic) rocks
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. One question on Bore hole problems.

REFERENCES:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

COURSE OUTCOMES:

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

1. Identify Mega-scopic minerals & their properties in civil engineering
2. Identify Mega-scopic rocks & their properties in civil engineering
3. Identify the site parameters such as contour, slope & aspect for topography.
4. Know the occurrence of materials using the structural (strike & dip) problems in civil engineering purpose.

A1CEL206	ENGINEERING GEOLOGY LAB										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√	√		√							√
CO-2	√	√		√							√
CO-3	√	√		√							√
CO-4	√	√		√							√

A1CEL206	ENGINEERING GEOLOGY LAB
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET214	SEMESTER-VI	L	T	P	C
	DESIGN OF STEEL STRUCTURES	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite : Strength of Materials, Structural Analysis				

COURSE OBJECTIVES	
1.	To outline different methods of connections and behaviour of welded connections for various loads
2.	To explain the behaviour of various members in Steel Structures
3.	To introduce the concepts of analysis and design of various members in Steel Structures.
4.	To explain the use of IS 800-2007 codal provisions for design of various members in Steel Structures

SYLLABUS

UNIT-I (Introduction & Connections) **Total=08hrs**

Introduction: Course Introduction-Necessity of steel structures- Advantages and Disadvantages of Steel Structures-Applications.

Connections: Revit/Bolt connection- Installation – Types of bolts - Calculation of Revit value- Design of Revit connection for plates subjected to axial load - Welded Connection-Introduction-Advantages and Disadvantages of welded connection over rivet/bolt connections-Strength of butt and fillet welds-IS 800-2007 codal requirements-Design of fillet weld for concentric and eccentric connections.

UNIT-II (Plastic Analysis) **Total=08hrs**

Introduction-plastic hinge concept - plastic modulus - shape factor - upper and lower bound theorems - collapse mechanisms - combined mechanism - plastic analysis of beams by equilibrium and mechanism methods.

UNIT-III (Beams) **Total=08hrs**

Allowable stresses-IS 800-2007 Codal provisions for beams-Different failure modes-Design of laterally supported beams- Check for deflection-Web buckling-Web crippling-Design of laterally unsupported beams.

UNIT-IV (Tension and Compression Members) **Total=08hrs**

Tension Members: Various failure modes- IS800-2007 Codal provisions -Design of tension members for axial load.

Compression Members: Effective length of compression members-Slenderness ratio-Permissible stresses-Design of columns and struts for axial loads.

UNIT-V (Design of Built up-Columns) **Total=08hrs**

Necessity of built up columns- Different shapes of cross sections

IS 800-2007 codal provisions for lacing system – Design of Laced column

IS 800-2007 codal provisions for battens – Design of Battened Column

UNIT-VI (Plate Girder) **Total=08hrs**

Necessity-Component parts – Design considerations-IS 800-2007 Codal provisions - Design of welded plate girder with Transverse and Longitudinal stiffeners

Drawing Practice:

1. Detailing of Beams **2 hrs**
2. Detailing of Laced Column and Battened Column **4 hrs**
3. Detailing of Plate Girder with Transverse and Longitudinal stiffeners **3 hrs**

Text Books:

1. Steel Structures Design and Practice by N. Subramanian, Oxford university press.
2. Design of steel structures by limit state method as per IS 800-2007 by S.S. Bhavikatti, I.K. International publishing house Pvt. Ltd.

Reference Books

1. Structural design in steel by Sarwar AlamRaz, New Age International Publishers, New Delhi.
2. Design of Steel Structures by M. Raghupathi, Tata Mc-Graw Hill.
3. Design of Steel Structures, Negi L. S, Tata Mc-Graw Hill Publishing Pvt. Ltd, New Delhi.

Outcomes:

After successful completion of the course, the student is expected to

1. Know the behaviour of beams, tension and compression members in steel structures.
2. Design beams, tension and compression members as per IS 800-2007 in steel structures.
3. Design welded connections for axial, moment and torsional loads.
4. draw the detailing of beams, tension members, compression members and plate girders as per the design

A1CET214	DESIGN OF STEEL STRUCTURES										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√				√		√
CO-2	√		√		√				√		√
CO-3	√		√		√				√		√
CO-4	√		√		√				√		√

A1CET214	DESIGN OF STEEL STRUCTURES
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET215	SEMESTER-VI	L	T	P	C
	ADVANCED REINFORCED CONCRETE STRUCTURES	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite : Design of RC structures				

COURSE OBJECTIVES	
1.	To teach design and detailing of RCC two way slabs and stair case
2.	To explain design and detailing of strip and combined footing
3.	To outline the concept of prestressing and explain analysis and design of pre stressed concrete beams
4.	To explain the methods of estimating various losses in pre stressed concrete beams

SYLLABUS

UNIT I (Design of Two way slabs) **Total=6hrs**

Behavior, Design of two way slab for simply supported and continuous slab as per IS 456, Detailing of slabs

UNIT II (Design of Staircase) **Total=6hrs**

General features, types of stair case, loads on stair cases, effective span as per IS code provisions, distribution of loading on stairs, Design and detailing of dog legged stair case with waist slabs.

UNIT III (Design of Strip and Combined Footings) **Total=10hrs**

Design and detailing of Strip and Combined footings (beam and slab type).

UNIT IV (Prestressed Concrete) **Total=8hrs**

History of prestressing, General principles of prestressing – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel and their characteristics. Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System (Theory only).

UNIT V (Analysis and Design of Different Types of Prestressed Beams)Total=10hrs

Elastic analysis of concrete beams pre stressed with straight, concentric, eccentric, bent and parabolic tendons (Limited to calculation of stresses during working and transfer)- Pressure line-Design of simply supported pre stressed beam for flexure as per IS1343-2012

Unit VI (Losses of Prestress) **Total=8hrs**

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage and frictional losses.

TEXT BOOKS:

1) Design of Reinforced Concrete structures – N. Subramanian, Oxford publishers
2) Prestressed Concrete by Krishna Raju - Tata McGraw Hill Publications.
3) Prestressed concrete by N.Rajagopalan – CRC Press 2002

REFERENCE BOOKS

1) Reinforced Concrete Design by A.K Jain, Nem Chand & Bros.
2) Design of Prestressed Concrete Structures by T Y Lin, NED H Burns,John Wiley & Sons
3) BIS1343-2012, "Code of Practice for Prestressed concrete"

OUTCOMES:

After successful completion of the course, the student is expected to

1. Design and detail RCC two way slabs and staircases.
2. Design and detail RCC strip and combined footing.
3. Analyse and design simply supported pre stressed concrete beams.
4. Estimate various losses in Prestressed concrete beams.

A1CET215	**ADVANCED REINFORCED CONCRETE STRUCTURES**										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√				√		√
CO-2	√		√		√				√		√
CO-3	√		√		√				√		√
CO-4	√		√		√				√		√

A1CET215	**ADVANCED REINFORCED CONCRETE STRUCTURES**
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET216	SEMESTER-VI	L	T	P	C
	FOUNDATION ENGINEERING	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite : Geotechnical Engineering				

COURSE OBJECTIVES	
1.	To impart the knowledge on types of shallow foundations and theories required for the determination of soil bearing capacity
2.	To explain procedure of the computation of immediate and consolidation settlements of shallow foundations
3.	To explain the principles of important field tests such as SPT and Plate bearing test.
4.	To explain the concepts of pile foundations and assessment of the load carrying capacity

SYLLABUS

UNIT I (Earth pressures) **Total= 8hrs**

Fundamental concepts – Active and Passive earth pressures in Coarse and fine grained soils- Rankine's & Coulomb's theory- Culmann's graphical method- earth pressure against bracing in cuts and sheet pile walls.

UNIT II (Stability of slopes) **Total= 9hrs**

Infinite and finite slopes- Factor of safety- forms of slip surface- stability analysis- Swedish circle, method of slices, Taylor's stability number- stability of earth dams under various conditions.

UNIT III (Shallow Foundations) **Total= 9hrs**

Different types of foundations- Bearing capacity- Terzaghi and IS method- Plate load test and its limitations.

Settlement Criteria: Safe bearing pressure based on N- value- components of settlement- allowable limits of settlement- steps involved in proportioning of footings.

UNIT IV (Pile Foundation) **Total= 8hrs**

Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays, pile settlements, uses of bentonite in pile construction

UNIT V (Soil Exploration) **Total= 8hrs**

Role of site investigation-Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – rock sampling - soil investigation report.

Well Foundations: Types – Different shapes of well – Components of wells – functions – forces acting on well foundations - Design Criteria – allowable bearing pressure- lateral stability- analysis based on bulkheads and IRC methods - Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift.

UNIT VI (Expansive soils) **Total= 6hrs**

Introduction, identification of expansive soils- adverse effects of swelling- design of foundations on expansive soils.

TEXT BOOKS:

1. 'Principles of Foundation Engineering' by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning
2. 'Basic and Applied Soil Mechanics' by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
3. Foundation analysis and design- J.E. Bowles- McGraw Hill (India) private limited.

REFERENCES:

1. Foundation design and construction by M.J. Tomlinson, Pearson Education Limited.
2. 'Soil mechanics, Foundations and Earth structures' by G.Tschebotarioff, McGraw Hill book company
3. 'Soil strength and Slope stability'by J.M.Duncan and S.E.Wright , John Wiley and Sons
4. IS 1904 and IS 2911

Course Outcomes:

Upon the successful completion of this course the student is expected to

1.select the type of foundations based on field data.

2.determine the magnitude of immediate and consolidation settlement and decide the size of the foundation based on strength and settlement criteria.

3. determine the stability of slopes in cutting as well as in banking using different theories.

4. outline the procedure to assess the earth pressures required for design of retaining walls

A1CET216	FOUNDATION ENGINEERING										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√			√	√						√
CO-2	√			√	√						√
CO-3	√			√	√						√
CO-4	√			√	√						√

A1CET216	FOUNDATION ENGINEERING
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET217	SEMESTER-VI	L	T	P	C
	ENVIRONMENTAL ENGINEERING -II	3	1	0	4
	Total Contact Hours – 48(L)+16(T)				
	Prerequisite : Water Supply Engineering				

COURSE OBJECTIVES	
1	To outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city.
2	To provide knowledge of characterization of wastewater generated in a community.
3	Impart knowledge on treatment of sewage and the need for its treatment.
4	To explain effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers.

SYLLABUS

UNIT I (Introduction to Wastewater Engineering) **Total=08hrs**

House drainage –components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing-Systems of Sewerage –Storm water estimation – time of concentration-Design of sewers – shapes and materials – sewer appurtenances.

UNIT II (Wastewater Treatment I) **Total=10hrs**

Characteristics of Sewage – B.O.D. – C.O.D.- Sampling, Analysis & population equivalent; Layout and general outline of various units in a Sewage and Effluent treatment plant – Primary treatment Screens, Grit Chamber, Skimming tanks, and Equalization tank.

UNIT III (Suspended Growth Process) **Total=07hrs**

Activated Sludge Process, principles, working, and operational problems- Design of Activated Sludge process; Oxidation ponds, Aerated Lagoons, SBR and MBR techniques.

UNIT IV (Attached Growth Process) **Total=07hrs**

Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems

UNIT V (Wastewater Treatment II) **Total=08hrs**

Construction and design of septic tank – soak pits- sludge digestion-Ultimate disposal of sewage – sewage farming – dilution

UNIT VI (Water Quality Modeling) **Total=8hrs**

Modelling approaches to water quality - classification – Mathematical Models for water quality. DO. Models for Streams - Streeter Phelps model – oxygen sag curve – deoxygenationandreaeration coefficients - Benthal oxygen demand - mass transport mechanisms – Advective and diffusive mass transport - Models for Estuary and Lakes.

TEXT BOOKS:

1. Wastewater Engineering by Metcalf and Eddy, Tata McGraw-Hill Education.
2. Water and Wastewater Technology by Steel, New age International.
3. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publishers.

REFERENCE BOOKS:

1. Manual of Sewage and Sewerage Treatment - CPHEEO, 1999.
2. Wastewater treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India.
3. Benefield, L. D.andRandallC.W. Biological Processes Design for waste waters, Prentice-Hall, Inc. EaglewoodCliffs,1982.

OUTCOMES:

By the end of successful completion of this course, the students are expected to:

1. Plan and design the sewerage systems.
2. Select the appropriate appurtenances in the sewerage systems.
3. Select suitable treatment flow for sewage treatment.
4. Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river.

A1CET217	ENVIRONMENTAL ENGINEERING-II										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	K
CO-1	√		√		√						√
CO-2	√		√		√						√
CO-3	√		√		√						√
CO-4	√		√		√						√

A1CET217	ENVIRONMENTAL ENGINEERING-II
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET304	SEMESTER-VI (CORE ELECTIVE-II)	L	T	P	C
	ADVANCED STRUCTURAL ANALYSIS	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Structural analysis, Strength of materials and Mathematics				

COURSE OBJECTIVES	
1.	To deliver the concept of energy methods in elastic system.
2.	Equip student with concepts of Arches and cables.
3.	To explain analysis of framed structures for lateral loads using approximate methods
4.	To impart the concept of matrix methods of analysis

SYLLABUS

UNIT I (Energy Methods) **Total=08hrs**

Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT II (Three Hinged Arches) **Total=07hrs**

Three hinged circular and parabolic arches with supports at same and different levels. Determination of thrust, shear and bending moment.

UNIT III (Cables) **Total=08hrs**

Analysis of Cables under point loads and UDL with supports at same and different levels. Three hinged and two hinged Stiffening girders.

UNIT IV (Approximate Methods) **Total=08hrs**

Approximate methods of structural analysis of multi-storey, multi-bay portal frame for vertical and lateral loads using Substitute frame method, Portal method and Cantilever method.

UNIT V (Flexibility Matrix Method) **Total=05hrs**

Introduction to Matrix methods of analysis, concept of flexibility method, concept of stiffness method, Analysis of beams using flexibility method with static indeterminacy equal to 1(for vertical loading).

UNIT VI (Stiffness Matrix Method) **Total=12hrs**

Introduction and application to continuous beams and portal frame with kinematic indeterminacy not more than three.

TEXT BOOKS:

1. Analysis of Structures, Thandavamurthy, Oxford University Press, Edition 2011.
2. Structural Analysis – R.C. Hibbler, Pearson, New Delhi.
3. Matrix Analysis of Framed Structures by William Weaver and James M. Gere

REFERENCE BOOKS

3. Theory of Structures Vol. 1 and 2 - S.P. Gupta, G.S. Pandit and R. Gupta, Tata McGraw Hill Publication Company Ltd.
4. Intermediate Structural Analysis – CK Wang, MC. Graw hill.
5. Structural Analysis, Devdas Menon, Alpha Science, 2008.

OUTCOMES:

After successful completion of the course, the student is expected to

1. Analyse structures using energy methods.
2. Analyse Cable and Suspension Bridge structures.
3. Carry out lateral Load analysis of structures by using approximate methods.
4. Analyse structures using Matrix methods.

A1CET304	**ADVANCED STRUCTURAL ANALYSIS**										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET304	**ADVANCED STRUCTURAL ANALYSIS**
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

AICET305	SEMESTER-VI (CORE ELECTIVE-II)	L	T	P	C
	REPAIR AND REHABILITATION OF STRUCTURES	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Concrete Technology				

COURSE OBJECTIVES	
1.	To teach various causes of distresses caused in a structures
2.	To explain various methods for repairing distressed structures
3.	To demonstrate rehabilitation methods
4.	To teach damage assessment methods using NDT equipment

SYLLABUS:

UNIT-I (Distresses in Concrete Structures) **Total=9hrs**

Distresses in Concrete Structures: Causes - Natural and man-made cause. Materials available for Repair of distresses. evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects –

UNIT-II (Damage Assessment) **Total=8hrs**

Destructive Testing Systems-Non-Destructive Testing Systems-Semi-Detructive Testing Systems, Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact-echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT-III (Strengthening of RCC Structures) **Total=8hrs**

Cracks in concrete, Possible damages to the structural elements- beams, Slab, Column, Footing, etc., strengthening techniques like Jacketing, Grouting, External prestressing, Use of chemical admixtures, strengthening of fire damaged structures.

UNIT-IV (Repairs to heritage structures) **Total=8hrs**

Damages to masonry structures and heritage buildings and their Repairing techniques.

UNIT-V (Foundation Problems) **Total=8hrs**

Various foundation problems- Settlement of foundations – Repairs.

UNIT-VI (Investigation of structures) **Total=7hrs**

Distress, observation and preliminary test methods, Case studies related to rehabilitation of bridge piers, dams, canals, corrosion and erosion damaged structures.

TEXT BOOKS:

1. "Deterioration, Maintenance and Repair of Structures" by Johnson, McGraw Hill.
2. "Deterioration, Maintenance and Repair of Structures" by Johnson, McGraw Hill.
3. "Repair and rehabilitation of Structures" by Vidivelli. Standard publishers

REFERENCE BOOKS:

1. "Concrete Structures: Repairs, Water Proofing and Protection" by Philip H. Perkins, Applied Sciences Publications Ltd., London,
2. "Design and Construction, Failures, Lessons from Forensic Investigation" by Dov Kaminetzky, McGraw Hill,
3. "Durability of Concrete Structure: Investigation, Repair, Protection" Edited by Geoffmangs, E. & FN SPON, An Imprint of Chapman & Hall,.
4. "Repairs of Fire Damaged Structures" by Jagadish, R.

COURSE OUTCOMES:

After successful completion of the course, the student is expected to

1. Asses various distresses in structures.
2. Analyse damage of structural elements and suggest suitable repairing technique.
3. Assess various temporary buildings and need for rehabilitation.
4. Investigate distresses in canals, bridge piers, corrosion and erosion damaged structures.

AICET305 REPAIR AND REHABILITATION OF STRUCTURES											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√				√		√
CO-2	√				√				√		√
CO-3	√				√				√		√
CO-4	√				√				√		√

AICET305 REPAIR AND REHABILITATION OF STRUCTURES	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council, *****

A1CET306	SEMESTER-VI (CORE ELECTIVE-II)	L	T	P	C
	CONSTRUCTION EQUIPMENT AND METHODS	3	0	0	3
	Total Contact Hours – 48				
	Prerequisite : None				

COURSE OBJECTIVES	
1.	To introduce the various equipments related to construction activities
2.	To mention criteria for selection of equipment based on applications, utilization, productivity, and other factors
3.	To teach the elements of equipment cost and evaluating investment alternatives
4.	To demonstrate awareness of construction safety related to earthmoving operations

SYLLABUS

UNIT I **Total=8hrs**

Introductions to Construction equipments – economic considerations – Description and Working of equipments related to Earth Work (Excavators), Concrete, and Road Laying.

UNIT II **Total=8hrs**

Earthwork equipments – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production.

UNIT III **Total=8hrs**

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets.

UNIT IV **Total=8hrs**

Compaction equipments – types of compaction rollers. Description and components of Pavers, Skidders, Wheel Loaders and others.

UNIT V **Total=8hrs**

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate concrete mixers – mixing and placing of concrete – consolidating and finishing.

UNIT VI **Total=8hrs**

Construction methods – piling – form work – fabrication and erection – quality and safety engineering. - Modern trends in construction practice.

TEXT BOOKS

1. Construction planning, Equipment and methods, R.L. Peurify, TMH, 1996.
2. Construction Equipment and its Planning and Applications by Mahesh Varma, Metropolitan Book Co. (P) Ltd., New Delhi. India.

REFERENCE BOOKS

1. Construction Machinery and Equipment in India (A compilation of articles Published in Civil Engineering and Construction Review) Published by Civil Engineering and Construction Review, New Delhi, 1991.

COURSE OUTCOMES

After successful completion of this course, the student is expected to

1. Select proper construction equipment for the given purpose.
2. Describe various construction equipments based on applications, utilization, productivity.
3. Know the elements of equipment cost and evaluate investment alternatives.
4. Implement activities related to safety measures during various construction activities.

A1CET306	CONSTRUCTION EQUIPMENT AND METHODS										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	A	b	c	d	e	f	g	h	i	j	k
CO-1	√				√				√	√	√
CO-2	√				√				√	√	√
CO-3	√				√				√	√	√
CO-4	√				√				√	√	√

A1CET306	CONSTRUCTION EQUIPMENT AND METHODS
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council, *****

A1CEL207	SEMESTER-VI	L	T	P	C
	Transportation Engineering Lab	0	0	3	2
	Total Contact Hours – 48				
	Prerequisite : Transportation Engineering-1				

COURSE OBJECTIVES	
1	To teach testing of various properties of aggregates related to pavement construction
2	To teach the process to determine various properties of bitumen for pavement construction
3	To explain Marshal method of bituminous mix design
4	To demonstrate traffic studies

SYLLABUS

I. Tests on aggregates

1. Aggregate Crushing Value Test.
2. Aggregate Impact Value Test.
3. Los Angles Abrasion Value Test.
4. Deval's Attrition value Test.
5. Flakiness Index and Elongation Index Test.
6. Specific Gravity and Water Absorption Test.

II. Tests on bitumen

1. Penetration Test.
2. Softening Point Test.
3. Ductility Test.
4. Elastic Recovery Test.
5. Flash Point and Fire Point Test.
6. Viscosity Test.

III Test on Bituminous Mix

1. Marshall method of Bituminous Mix design.

IV Traffic Surveys

1. Traffic volume counts.
2. Parking study.
3. Intersection turning movements study.
4. Spot Speed study.
5. Axle load and tyre pressure survey.

References

1. Highway Materials Testing: Khanna , Justo and A Veeraraghavan.
2. Laboratory Testing in Highway Engineering (Instruction Manual), AK Duggal.

OUTCOMES:

After successful completion of this course, the student is expected to

1. Determine various properties of aggregates related to pavement construction.
2. Determine various properties of bitumen for pavement construction.
3. Design bituminous mix for pavement.
4. To conduct traffic studies.

A1CEL207 Transportation Engineering Lab											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√	√									√
CO-2	√	√									√
CO-3	√	√									√
CO-4	√	√									√

A1CEL207 Transportation Engineering Lab	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council, *****

A1CEL208	SEMESTER-VI	L	T	P	C
	Geotechnical Engineering Lab	0	0	3	2
	Total Contact Hours – 48				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To determine index properties of the soils for classification
2.	To find compaction properties of fine and coarse grained soils
3.	To determine field density, CBR value of the soil
4.	To explain the procedure to determine the mechanical properties of soils

SYLLABUS

LIST OF THE EXPERIMENTS

1) Atterberg limits and indices
   a. Liquid limit b. Plastic limit c. Shrinkage limit
2) Determination of field density
   a. Core Cutter method
   b. Sand replacement method
3) Grain size analysis
   a. Sieve analysis
   b. Hydrometer/pipette analysis
4) Determination of permeability of soil
   a. Constant head test for coarse grained soils
   b. Variable head test for fine grained soils
5) Proctor compaction test:
   a) IS Light weight compaction for coarse grained soils including determination of specific gravity
   b) IS Light weight compaction for fine grained soils including determination of specific gravity b.
6) Unconfined compression (UCC) test
7) Direct shear test
8) Tri-axial test
9) Vane shear test
10) California bearing ratio (CBR) test
11) Differential free swell
12) Relative density (to be demonstrated)
13) Consolidation test (Demonstration)
14) Swell pressure test (Demonstration)

References:

1. Determination of soil properties by J.E. Bowles
2. Soil testing (Laboratory manual) by H.D. Charan and K.S. Grover.
3. IS Code 2720 – relevant parts.
4. Soil mechanics and foundation engineering by DR.K.R. Arora.

OUTCOMES:

After successful completion of this course, the student is expected to

1. Classify the soil based on index properties and mechanical analysis of soil
2. Determine field density and density in the laboratory
3. Determine mechanical properties, CBR value, and differential free swell.
4. Write a technical report based on the laboratory tests conducted on the soils obtained from the field

A1CEL208 Geotechnical Engineering Lab											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√	√									√
CO-2	√	√									√
CO-3	√	√									√
CO-4	√	√									√

A1CEL208 Geotechnical Engineering Lab	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council, *****

A1CET218	SEMESTER-VII	L	T	P	C
	ESTIMATION AND CONTRACTS	3	1	0	4
	Total Contact Hours – 48(L) +16(T)				
	Prerequisite : Building materials and concrete technology				

COURSE OBJECTIVES	
1.	To impart knowledge on various aspects of quantity estimation of various items involved in buildings, water supply and sanitary works, road works and irrigation works.
2.	To teach rate analysis, valuation of properties and preparation of reports for estimation of various items.
3.	To explain estimation of material quantities, preparation of bill of quantities and tender documents.

SYLLABUS:

UNIT-I **Total = 8hrs**

General introduction to quantity surveying – purpose of estimates- types of estimates - various items to be included in estimates - principles in selecting units of measurement for items

UNIT-II **Total=8hrs**

Earthwork estimation for roads and canals - reinforcement bar bending and bar requirement schedules.

UNIT-III **Total = 8hrs**

Specifications – purpose and basic principles of general and detailed specifications - Standard specifications for different items of building constructions.

UNIT-IV **Total = 8hrs**

SSR-Rate Analysis – Working out data for various items of work over head and contingents charges.

UNIT-V **Total = 8hrs**

Contracts – Types of contracts – contract documents – conditions of contract.

UNIT VI **Total = 8hrs**

Detailed Estimation of Buildings using Long wall & Short wall and centre line method - Demonstration of software for estimation of quantities.

TEXT BOOKS:

1. "Estimating, Costing, Specification & Valuation In Civil Engineering", by M.Chakraborti.
2. "Estimating and Costing in Civil Engineering", by B.N. Dutta, UBS Publishers Pvt Ltd .
3. "Estimating, costing and valuation" by Rangwala, Charotar Publishers.

REFERENCE BOOKS:

1. "A Text book of Estimating and Costing (CIVIL)" by D.D. Kohli, R.C. Kohli, S.Chand Publishing ltd.
2. Standard Schedule of rates and standard data book by public works department.
3. IS 1200 (Parts I to XXV-1974/ M of M of Building & Civil Engg Works – B.I.S.)
4. National Building Code of India 2005.

COURSE OUTCOMES:

Upon successful completion of this course, the student is expected to

1. Determine the quantities of different components of buildings
2. Calculate Earthwork quantities for roads and canal works
3. Find the cost of various building components
4. Prepare contract documents for a project

A1CET218	ESTIMATION AND CONTRACTS										
	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√			√	√						√
CO-2	√			√	√						√
CO-3	√			√	√						√
CO-4	√			√	√						√

A1CET218	ESTIMATION AND CONTRACTS
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.207
	Ratified by: 1st Meeting of Academic Council, *****

A1CET307	SEMESTER-VII(CORE ELECTIVE III)	L	T	P	C
	Railways, Harbours and Airports	**3**	**0**	**0**	**3**
	Total Contact Hours – 48(L)				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To teach the design elements of railway track and its components.
2.	To impart knowledge on safe train operating procedures.
3.	To explain various elements of airport planning and designing airport features.
4.	To explain elements of ports and harbour planning and designing their features.

SYLLABUS

UNIT-I (Introduction to Railway Engineering) **Total=8hrs**

Permanent way cross-section and components, Gauge and need for uniform gauge in a country, Functions of various components like Rails, Sleepers, Ballast and Rail fastenings, Creep of rails and theories of creep, Coning of wheels and adzing of sleepers, Sleeper density, Rail joints, Introduction to types of Railway transport (Metro, Mono rail, LRT, BRTS etc.,)

UNIT- II (Geometric design of Railway track) **Total=8hrs**

Alignment requirements and surveys for a new alignment, Gradients and grade compensation, Cant, cant deficiency and negative super elevation , Degree of curve and safe speed on curves, Types of curves - transition curves, compound curves, reverse curves -Extra clearance and widening of gauge on curves , Check rail on curves , Vertical curves

UNIT-III (Points, Crossings, Signals & Interlocking) **Total=8hrs**

Track layouts and turnouts, Switches: types and design, Layout of turnout and double turnout, Crossings - diamond crossing, scissors crossing, Railway signals: objectives and classification, Signalling systems, mechanical signalling systems, electrical signalling systems System of controlling train movement, Interlocking and Modern Signalling Systems

UNIT-IV (Airport Planning & Design) **Total=8hrs**

Airport master plan, Airport site selection, Aircraft characteristics, Zoning laws, Airport classification, type of level of comfort, Wind rose diagram and runway orientation , Runway length and taxiway design, Terminal area and airport layout, Visual aids and air traffic control, Frangible structures

UNIT-V (Airport Maintenance) **Total=8hrs**

Runway structural design and design considerations, Airfield pavement failures, Maintenance and rehabilitation of airfield pavements, Evaluation and strengthening of airfield pavements, Airport drainage, Design of surface drainage, Design of subsurface drainage.

UNIT-VI (Planning & Layout of Docks and Harbors) **Total=8hrs**

Classification of ports & harbors, Requirements of good port and site selection criteria, Docks: dry and wet docks, Transition sheds & warehouses: requirements and layouts, Quays, wharves, jetties, dolphins and moorings, Tides and tidal data analysis, Break waters, Dredging, maintenance of ports and harbors, Navigational aids in ports and harbors.

TEXT BOOKS:

1. Saxena and Arora – Railway Engineering – Dhanpat Rai, New Delhi
2. Bindra S. P. Docks and Harbour Engineering – Dhanpat Rai and Sons, New Delhi
3. Highway, Railway, Airport and Harbor Engineering – K. P. Subramanian, SciTech Publishers.

REFERENCE BOOKS:

1. Agrawal M.M. – Indian Railway Tracks, Prabhakar & Co
2. Wright P. H. & Asfort N. J. Transportation Planning and Design – John Wiley & Sons.
3. Khanna & Arora – Airport Engineering – Nemchand Bros, New Delhi.

COURSE OUTCOMES:

After successful completion of this course, the student is expected to

1. Plan, design and maintain a railway track and its elements.
2. Design safe train operating systems and procedures.
3. Plan, design and maintain various elements of Airports.
4. Plan, design and maintain various elements of Ports and Harbours.

A1CET307	**Railways, Harbours and Airports**										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√					√	√
CO-2	√		√		√					√	√
CO-3	√		√		√					√	√
CO-4	√		√		√					√	√

A1CET307	**Railways, Harbours and Airports**
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council, *****

A1CET308	SEMESTER-VII(CORE ELECTIVE III)	L	T	P	C
	ADVANCED WATER RESOURCES ENGINEERING	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Water resources engineering				

COURSE OBJECTIVES	
1.	To introduce the concepts of planning and design of irrigation systems
2.	To discuss the soil- water- plant relationships
3.	To explain the design of unlined channels
4.	To impart the design principles of hydraulics structures

SYLLABUS:

UNIT-I (CANALS) **Total=8hrs**

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals - Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT-II (CANAL STRUCTURES) **Total=10hrs**

Canal Structures: Falls- types and location, design principles of Sarda type fall and straight glacis fall. Regulators- design principles of head and cross regulators, Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage, design of aqueduct. Outlets: types, and performance of outlets, River Training works.

UNIT-III (DIVERSION HEAD WORKS) **Total=8hrs**

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-IV (RESERVOIR PLANNING) **Total=6hrs**

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

UNIT-V (GRAVITY DAMS) **Total=8hrs**

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

UNIT-VI (EARTH DAMS & SPILLWAYS) **Total=8hrs**

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

TEXT BOOKS:

1. 'Irrigation Engineering' by Raghunath H.M (2012), Wiley India.
2. 'Irrigation Water Resources and Water Power Engineering' by Modi P N (2011), Standard Book House, New Delhi.
3. Irrigation and water resources engineering by S K Garg, Khanna Publishers.

REFERENCE BOOKS:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T.K (2012), S. Chand Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.

COURSE OUTCOMES:

After successful completion of the course, the student is expected to

1. Plan an irrigation system and design irrigation canal structures.
2. Plan and design diversion head works.
3. Analyse stability of gravity and earth dams.
4. Design ogee spillways and energy dissipation works.

A1CET308 ADVANCED WATER RESOURCES ENGINEERING											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET308 ADVANCED WATER RESOURCES ENGINEERING	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET309	SEMESTER-VII(CORE ELECTIVE III)	L	T	P	C
	STRUCTURAL DYNAMICS	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Mathematics, Structural Analysis				

COURSE OBJECTIVES	
1.	To introduce the concepts of dynamic loading and formulation of equation of motion.
2.	To teach mathematical modelling of SDOF systems and the concepts of damping in dynamic loading
3.	To explain the procedure for determination of response of free and forced SDOF system.
4.	To explain the procedure for determination of response of free and forced MDOF system.

SYLLABUS:

UNIT-I (Introduction) **Total=8hrs**

Introduction to Dynamic Loading-Types of Vibrations- Degrees of Freedom- D'Alembert's principle - Mass Discretization-Mathematical modelling of SDOF systems

UNIT-II (Free Vibration of SDOF System) **Total=8hrs**

Undamped and Damped systems- Response of Undamped SDOF system -Types of damping- Response of damped SDOF system for under, critical and over damped Cases- Logarithmic decrement Method.

UNIT-III (Forced Vibration of SDOF System) **Total=8hrs**

Introduction - Response of Undamped and damped systems to Harmonic Excitation- Characteristic curves.

UNIT-IV (Response to General loading) **Total=8hrs**

Periodic loading: Introduction- Fourier series and response to Fourier series loading- Rectangular, Triangular loading

Impulse loading: Duhamel's Integral-Rectangular, Triangular.

UNIT-V (Free Vibration of Two degrees of freedom system) **Total=8hrs**

Concept of shear building - Modes of vibration - Free vibration Analysis of Undamped system. Determination of Fundamental Frequency and mode shapes.

UNIT-VI (Free Vibration of MDOF system) **Total=8hrs**

Evaluation of structural property matrices – Free Vibration Analysis of MDOF Undamped System - Orthoganality conditions – Determination of Fundamental Frequency and mode shapes.

TEXT BOOKS:

1. Anil K. Chopra, (2003), Dynamics of Structures – Theory and Applications to Earthquake Engineering, Second Edition, Prentice-Hall India Private Ltd.
2. Mario Paz, (2001), Structural Dynamics – Theory and Computation, Second Edition – CBS Publishers.
3. Singiresu S. Rao, (2003), Mechanical Vibrations, fourth Edition, Pearson Education India Private Ltd.

REFERENCE BOOKS:

1. Pankaj Agarwal, Manish Shrikhande (2006), Earthquake Resistant Design of Structures, PHI Learning Private Limited.
2. Clough and Penzien, (2000), Dynamics of Structures, Second Edition, McGraw Hill Book Company.
3. Ashok Jain, (2016), Dynamics of structures with MATLAB applications, Pearson Education India Private Ltd.

COURSE OUTCOMES:

After successful completion of this course, the student is expected to

1. Be familiar with the concepts of dynamic loading, mass discretization, damping etc.,
2. Develop mathematical models for SDOF.
3. Determine dynamic response of Free and Forced vibrate SDOF models.
4. Determine dynamic response of Free and Forced vibrate MDOF models.

A1CET309 STRUCTURAL DYNAMICS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET309 STRUCTURAL DYNAMICS	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET310	SEMESTER-VII(CORE ELECTIVE IV)	L	T	P	C
	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Structural Analysis, Structural Dynamics, Mathematics				

COURSE OBJECTIVES	
1.	To give an overview of various causes, effects and types of earthquakes and damage to the structures due to earthquake.
2.	To teach the effect of various irregularities in the structure on its seismic performance
3.	To explain the calculation of design lateral forces on multi-storey buildings due to earthquake using IS codal provisions.
4.	To introduce the concept of ductility and corresponding detailing as per IS code.

SYLLABUS

UNIT-I (Engineering Seismology) **Total=8hrs**

Engineering Seismology- Causes and types of earthquakes- Structure of Earth-Continental Drift theory-Plate tectonic s-Elastic Rebound theory-Earthquake terminology-Magnitude and Intensity of earthquakes – Classification of earthquakes – Seismic waves- seismic zoning map of India.

UNIT-II (Seismic Planning) **Total=8hrs**

Vertical Irregularities

Vertical Discontinuous in Load Path-Irregularity in Strength and Stiffness-Mass Irregularities-Vertical Geometric Irregularity-Proximity of Adjacent Buildings.

Plan Configuration Problems

Torsion Irregularities-Re-entrant Corners-Non-parallel systems-Diaphragm Discontinuity.

UNIT-III (Earthquake Analysis) **Total=8hrs**

Introduction –Calculation of base shear and Earthquake analysis of single bay two storey multi storey frame using response spectra.

UNIT-IV (IS 1893 -2002 Design Provisions) **Total=8hrs**

Review of the Indian seismic code IS 1893 -2002 - Earthquake design philosophy – Assumptions – Design of portal frame by seismic coefficient and Response spectrum methods – Displacements and drift requirements.

UNIT-V (Detailing Provisions) **Total=8hrs**

Review of the Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of RC buildings- Beams, Columns and Joints

UNIT-VI (Shear Walls) **Total=8hrs**

Types and behaviour of shear walls- Boundary Elements – Codal design provisions of Shear walls – ductile detailing of shear walls.

TEXT BOOKS:

1. S.K.Duggal "Earthquake Resistant Design of Structures, Oxford University press
2. Pankaj Agarwal and Manish Shirkande (2006): Earthquake Resistant Design of Structures, Prentice Hall of India
3. Seismic Analysis of structures by T K Datta, Wiley Publishers

REFERENCE BOOKS:

1. Jai Krishna A.R, Chandrasekharan A.R, Brijesh Chandra, "Elements of Earthquake Engineering", 2nd Edition, South Asian Publishers, New Delhi, 2001.
2. Fundamentals of soil dynamics and earthquake engineering, Bharat Bhushan Prasad, PHI Learning Pvt. Ltd.,(2009)
3. IS Codes: IS: 1893, IS: 4326 and IS:13920-1993, Bureau of Indian Standards, New Delhi.

COURSE OUTCOMES:

After successful completion of the course, the student is expected to

1. Identify different irregularities in buildings and damages caused by such irregularities.
2. Determine the forces acting on the structure due to earthquakes.
3. Do the earthquake resistant design of portal frame as per Indian Standard codal Provisions
4. Do ductile detailing of different members in structures as per IS: 13920

A1CET310 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET310 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET311	SEMESTER-VII(CORE ELECTIVE IV)	L	T	P	C
	PAVEMENT ANALYSIS, DESIGN AND EVALUATION	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Transportation Engineering				

COURSE OBJECTIVES	
1.	To teach different factors influencing pavement design.
2.	To explain about stresses developed in flexible and Rigid pavements.
3.	To impart knowledge on evaluation and maintenance of flexible and rigid pavements
4.	To outline pavement management systems.

SYLLABUS:

UNIT-I (Types of Pavements) **Total=8hrs**

Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept-tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

UNIT-II (Stresses in Flexible Pavements) **Total=8hrs**

Stresses in flexible pavement – layered systems concept – one layer system – Boussiness Two layer system – Burmister Theory for Pavement Design.

UNIT-III (Stresses in Rigid Pavements) **Total=8hrs**

Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction, Westergaard's stresses due to warping, stresses due to loads, stresses due to friction.

UNIT-IV (Evaluation and Maintenance of Flexible Pavement Failures)Total=8hrs

Types of failures, causes, remedial/maintenance measures in regid pavements – Functional Evaluation by visual inspection and unevenness measurements.Pavement Evaluation Guidelines: Inspection and evaluation plan, Documents and evaluation review, Pavement condition review, experimental work, Determination of probable cause(s), Selection of best maintenance options, report on outcomes.

UNIT-V (Evaluation and Maintenance of Rigid Pavement Failures) **Total=8hrs**

Types of failures, causes, remedial/maintenance measures in regid pavements – Functional Evaluation by visual inspection and unevenness measurements. Pavement Evaluation Guidelines: Inspection and evaluation plan, Documents and evaluation review, Pavement condition review, experimental work, Determination of probable cause(s), Selection of best maintenance options, report on outcomes.

UNIT-VI (Pavement Management Systems) **Total=8hrs**

Importance of PMS, General methodology, Phase I: Functional classification of roads, identification of deficiencies, Assessment of maintenance needs, Phase II: Analysis of Structural and Functional Evaluation Analysis, Determination of Deficiencies, identification of least cost solutions, economic analysis. Phase III: Consider proposals for execution, Prepare database for PMS, Implementation and monitoring.

TEXT BOOKS:

1. Highway engineering by Khanna & Justo, Khanna Publishers.
2. Principles of Pavement Design - E. J. Yoder, M. W. Witczak, Wiley publishers.
3. IRC-37 and IRC-58

REFERENCE BOOKS:

1. Pavement Analysis and Design, second edition, by Yang H. Huang, Pearson Publishers,
2. AASHTO Pavement design guide.

COURSE OUTCOMES:

After completion of the course, the student is expected to

1. Know different factors influencing pavement design.
2. Calculate stresses developed in flexible and rigid pavements.
3. Be familiar with evaluation and maintenance of flexible and rigid pavements
4. Know pavement management system

A1CET311 PAVEMENT ANALYSIS, DESIGN AND EVALUATION											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√				√		√
CO-2	√				√				√		√
CO-3	√				√				√		√
CO-4	√				√				√		√

A1CET311 PAVEMENT ANALYSIS, DESIGN AND EVALUATION	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET312	SEMESTER-VII(CORE ELECTIVE IV)	L	T	P	C
	BUILDING CONSTRUCTION & SERVICES	3	0	0	3
	Total Contact Hours – 48 L				
	Prerequisite : None				

COURSE OBJECTIVES	
1.	To demonstrate the terms common to the Building Industry
2.	To identify and safely use hand and power tools commonly used in the Building Industry
3.	To display safe and professional work practices
4.	To explain basic principles used in Building Construction

SYLLABUS

UNIT- I (Masonry) **Total=8hrs**

Types of Stone Masonry – Plan, Elevation, Sections of Stone Masonry Works – Brick Masonry – Different Types of Bonds – Plan, elevation and Section of Brick Bonds – Partition walls – Hollow concrete Blocks – FAL- G Blocks.

UNIT -II (Finishing and Mortar Joints) **Total=8hrs**

Plastering – Pointing – Other Wall Surface Finishes – Dadooing with stones, Tiles etc.

Floorings: Flooring types – Granolithic, Stone floorings with locally available stones such as Cuddapah, Shabad etc., Marble Flooring, Terrazzo (Mosaic) Flooring, Tiles Flooring, and Rubber Flooring.

UNIT- III (Roofing) **Total=8hrs**

RCC roof, Madras Terrace, Asbestos Cement, Fibre glass, Aluminium, G.I and MS Sheet roofing. - Trusses: King Post & Queen Post Trusses – Steel roof Truss for 12m Span with details.

UNIT- IV (Doors, Windows and Ventilators) **Total=8hrs**

Wooden doors and windows – Glazed – Flush shutters - Plywood – Aluminium, PVC, Steel doors, windows and ventilators – Other various types of windows, Ventilators – different varieties. Painting of interior walls, exterior walls – Types of paints including distempers, emulsion paints etc., Varnishes wood work finishing types.

UNIT -V (Building services) **Total=8hrs**

Energy supply - gas, electricity and renewable sources - heating and ventilating - water, drainage and plumbing - day lighting and artificial lighting - escalators and lifts - communications, telephones and IT networks - security and alarm systems - fire detection and protection - air conditioning and refrigeration.

UNIT-VI (Green buildings) **Total= 8hrs**

Green buildings-Definition-Features- Necessity-Environmental benefits-Health and social benefits-Major energy efficient areas for buildings – Various energy efficient systems – Green materials

TEXT BOOKS

1. Construction Technology by R. Chudly, Vols I & II, 2nd Edition Longman, UK.
2. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
3. Construction Technology by Subir K. Sarkar and Subhajit Saraswati, Oxford University press.

REFERENCE BOOKS

1. Building Materials by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction Vol. II & III by W.B. McKay, E.L.B.S. and Longman, London, U.K.
3. Green building A to Z: Understanding the language of Green building by jerry Yudelson, New Society Publishers;

COURSE OUTCOMES:

After successful completion of the course, the student is expected to

1. Know the construction of masonry works
2. Know different types of roofing systems and their suitability
3. Have familiarity with general building service systems
4. Have familiarity with green building systems

A1CET312 BUILDING CONSTRUCTION & SERVICES											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√					√	√
CO-2	√				√					√	√
CO-3	√				√					√	√
CO-4	√				√					√	√

A1CET312 BUILDING CONSTRUCTION & SERVICES	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET313	SEMESTER-VII(CORE ELECTIVE V)	L	T	P	C
	GROUND IMPROVEMENT TECHNIQUES	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Geotechnical Engineering, Engineering Geology				

COURSE OBJECTIVES	
1.	To teach various densification methods of cohesive soils and cohesionless soils and various soil stabilization techniques.
2.	To impart concept of soil consolidation and dewatering methods.
3.	To teach about Geo-synthetics materials and its applications, properties.
4.	To explain about various grouting techniques for soil stabilization

SYLLABUS:

UNIT-I (In situ densification methods) **Total=10hrs**

In situ densification of granular soils: vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils: pre loading, vertical drains, sand drains, geo drains and stone columns, Soil nailing.

UNIT-II (Dewatering methods) **Total=8hrs**

Sumps and interceptor ditches – single and multi-stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis.

UNIT-III (Stabilization of soils) **Total=8hrs**

Methods of soil stabilization – mechanical – cement – lime – bitumen - chemical and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT-IV (Reinforced earth) **Total=8hrs**

Principles – components of reinforced earth – design principles of reinforced earth walls – stability checks.

UNIT-V (Geo-synthetics) **Total=6hrs**

Geotextiles – types – functions, properties and applications – geo-grids and geo-membranes - properties and applications.

UNIT-VI (Grouting) **Total=8hrs**

Objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests.

TEXT BOOKS:

1. 'Ground Improvement Techniques' by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, CRC Press.

REFERENCE BOOKS:

1. 'Ground Improvement' by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics' by RM Koerner , Prentice Hall
3. 'Engineering Principles of Ground Modification' by Monfred R Hausmann, McGraw Hill Publishing Co.

COURSE OUTCOMES:

After completion of this course the student is expected to

1. Know the importance and methods of soil densification and soil stabilization.
2. Know about the need for dewatering the soil and the consolidation process.
3. Aware of soil stabilization techniques using geosynthetics.
4. Stabilize the soil using grouting techniques.

A1CET313 GROUND IMPROVEMENT TECHNIQUES											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET313 GROUND IMPROVEMENT TECHNIQUES	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET314	SEMESTER-VII(CORE ELECTIVE V)	L	T	P	C
	INTRODUCTION TO FINITE ELEMENT METHODS	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Structural Analysis				

COURSE OBJECTIVES	
1.	To teach various classical methods of Structural Analysis and their relative merits and demerits
2.	To explain the History, concept and applications of FEM along with various steps involved in FEM as applicable to Structural Analysis problems.
3.	To explain the governing FE equations for different structural elements in 1D
4.	To demonstrate FEM to 1D structural Analysis problems with special emphasis on Cantilever beam and 2D truss

SYLLABUS:

UNIT-I Review of Methods of Structural Analysis **Total = 8 hrs**

Classification of Problems in Structural Analysis, Methods of Structural Analysis – Basic concepts of Strain Energy, Principle of Stationary Potential Energy (Ritz and Rayleigh-Ritz method), Virtual Work method, Weighed Residual Method (Galerkin's method), Numerical Methods (Finite difference method). Application of these methods to simply supported beams.

UNIT II Stiffness method **Total = 8 hrs**

Introduction to Matrix methods - Stiffness method, Flexibility method. Relative merits and demerits. Element stiffness matrix for 2D truss and beam element. Analysis of beams and truss with Degree of Kinematic indeterminacy < 4.

UNIT-III Theory of Elasticity Total= 8 hrs

Concept of Stress and Strain, Notation, Sign Convention, Stress-Strain Relationships, Strain-Displacement Relationships for 1D, 2D, Plane Stress and Plane Strain problems.

UNIT- IV Introduction to FEM **Total= 8 hrs**

Concept of Finite element method – Circle Perimeter, Weak from development. History, Merits and Demerits and Applications of Finite element Method. Finite element Method based Software's. Steps involved in FEM as applicable to Structural Analysis Problems.

UNIT V Discretization and Shape functions **Total= 8hrs**

Discretization and Choice of displacement Interpolation model - Convergence and Compatibility criteria, Geometric invariance and significance of Pascal's Criteria, Patch Test - Need for Patch test, Procedure, Confirming and non-confirming elements, Complete Elements, C0, C1 and C2 Continuity. Shape functions: properties, methods of determination. Shape functions for 1D bar element and beam element in local coordinate system.

UNIT-VI Applications of FEM **Total=8hrs**

Element Stiffness matrix Equation - Derivation of $[K] = \int [B]^T[D][B]dv$ based on Principle of Minimization of Total Potential Energy and Principle of Virtual Work. Static Condensation – Necessity. Assemblage of Element Stiffness Matrices - Interpretation of Results - Post processing – Necessity/Significance. Simple applications to axially loaded bars, simple beams and 2D trusses.

TEXT BOOKS:

1. Introduction to Finite Element Method, by Logan, CBL Engineering publishers
2. Introduction to Finite Element Method by Abel & Desai, CBS (2005) Publishers
3. Finite Element Analysis by SS Bhavikatti, New Age International Publishers.

REFERENCE BOOKS:

1. Finite Element Methods in Engineering by Chandrupatla and Belegundu– Pearson.
2. Finite Element Analysis – Theory and programming by C.S. Krishnamoorthy –McGraw Hill.
3. Finite Element Analysis – Singerasu S Rao, Butterworth-Heinemann, 2010 (5th Edition)

COURSE OUTCOMES:

After successful completion of the course, the student is expected to

1. Apply classical methods of Structural Analysis and to know their relative merits and demerits
2. Know History, concept and applications of FEM along with various steps involved in FEM as applicable to Structural Analysis problems.
3. Derive the governing FE equations for different structural elements in 1D
4. Analyse 1D structural Analysis problems with special emphasis on Cantilever beam and 2D truss using FEM

A1CET314 INTRODUCTION TO FINITE ELEMENT METHODS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET314 INTRODUCTION TO FINITE ELEMENT METHODS	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET315	SEMESTER-VII(CORE ELECTIVE V)	L	T	P	C
	PROJECT PLANNING AND MANAGEMENT	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : None				

COURSE OBJECTIVES	
1.	To introduce the concepts of Project Planning, Project Management, Scheduling and Controlling
2.	To explain the techniques of construction of networks, network elements and development also identification.
3.	To introduce the competencies in project costing, budgeting, and financial appraisal
4.	To outline the importance and necessity of management information systems.

SYLLABUS:

UNIT-I **Total=8hrs**

Introduction to Project Planning, Project Management, Scheduling and Controlling- Introduction to methods of planning and scheduling. Brief discussion on Bar charts and Milestone Charts.

UNIT-II **Total=8hrs**

PERT- Elements of Networks – Event, Activity, and Dummy Activity – Guidelines for the construction of the network – Development of PERT network – Numbering - Time estimates – Optimistic, Pessimistic and Most likely time estimates – Earliest Expected time and Latest Allowable Occurrence time.

Critical Path – Slack – Identification of Critical Path – Probability of Completion of projects.

UNIT- III **Total=8hrs**

CPM – Construction of network – Earliest Possible Occurrence time and Latest Possible Occurrence time – Start and Finish times of activities – Floats – Identification of Critical Path using floats.

UNIT-IV **Total=8hrs**

Updating – Data required for updating – Process of updating – When to update.

Resource allocation – Resource Smoothing – Resource leveling.

UNIT- V **Total=8hrs**

Project Management: The role of Management in Project environment – Scope of the Construction Management, Significance of Construction management, Concept of Scientific Management, Qualities of Manager.

UNIT- VI **Total=8hrs**

Management Information Systems: Importance of Management Information Systems (MIS), Logical Foundation of MIS, Classification of Information Systems and Impact of construction work on Management Information Systems. Introduction to Tools like MS project, PRIMEVERA etc.,

TEXT BOOKS:

1.Project Planning and Control with PERT & CPM by B.C. Punmia & K.K. Khandelwal, Laxmi Publishers.

2.Construction Management and Planning – Guna and Sen Gupta, B.

3.Construction Project Management Theory and Practice by Kumar Neeraj Jha (2011), Pearson.

REFERENCE BOOKS:

1.Robert Schulte's, Mary Sumner. (1999). "Management Information Systems - The Manager's View". Tate McGraw Hill Edition, New Delhi.

2.Construction Project Management - An Integrated Approach' by Peter Fewings, Taylor and Francis.

3.'Construction Management Emerging Trends and Technologies' by Trefor Williams, Cengage learning.

COURSE OUTCOMES:

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

1. Practice the process of project management and its application in delivering successful projects;
2. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities;
3. Identify the resources required for a project and to produce a work plan and resource schedule;
4. Plan and complete a project with PERT and CPM techniques with available resources.

A1CET315 PROJECT PLANNING AND MANAGEMENT											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√			√	√						√
CO-2	√			√	√						√
CO-3	√			√	√						√
CO-4	√			√	√						√

A1CET315 PROJECT PLANNING AND MANAGEMENT	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET316	SEMESTER-VII(CORE ELECTIVE VI)	L	T	P	C
	URBAN TRANSPORT PLANNING	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Transportation Engineering, Traffic Engineering				

COURSE OBJECTIVES	
1.	To discuss urban transport issues, collect data and assess the quality of urban transport.
2.	To compare strengths and weaknesses of various transport demand models.
3.	To outline calibration procedures of different transport demand models.
4.	To explain evaluation of different urban transport solutions.

SYLLABUS:

UNIT-I (Urban Travel Demand) **Total=8hrs**

Urban Development, transport problems and travel characteristics, Need for planning and overall planning process, Components of travel demand: Independent variables &Travel Attributes, Demand function and assumptions in demand estimation, Sequential travel demand modeling, Study Area: Zoning, cordon lines and screen lines

Data requirements for demand estimation: Socio-Economic surveys, Landuse Surveys, Traffic and Transport surveys, Study of reports and proposals.

UNIT- II (Trip Generation) **Total=8hrs**

Trip characteristics, Factors influencing trip production and attraction, Trip rates, Zonal regression models, Category analysis, Personal trip generation models, Zone mapping, linking land use to trip generation.

UNIT-III (Trip Distribution) **Total=8hrs**

Factors influencing trip distribution, Trip Length-Frequency Diagram, Growth Models: Growth factor methods, Linear Programming method, Opportunity models, Gravity opportunity model.

UNIT-IV (Mode Choice Analysis) **Total=8hrs**

Factors influencing mode choice, Zonal regression models, Utility maximization, Discrete Choice Situation, Binary and multinomial logit models, Probability curves, Probit and nested logit models.

UNIT-V (Traffic Assignment) **Total=8hrs**

Need for assignment, Objectives, Diversion curves, Shortest path algorithms Assignment techniques: all or nothing assignment technique, capacity restraint assignment technique, multi path assignment technique, Link flows: sufficiency and deficiency analysis.

UNIT-VI (Plan Preparation and Evaluation) **Total=8hrs**

Types of plans: conceptual plans, master plan etc., Short term planning Vs long term planning, Corridor identification and evaluation techniques, Role of mass transit in urban transportation, Alternate systems of different mass transit systems, Multimodal integration and master plan preparation.

TEXT BOOKS:

1. Khanna S.K., And Justo C.E.G - Highway Engineering – Nem Chand Bros., Roorkee.
2. MORTH Publications - Specifications for Roads and Bridges - Manual for Maintenance of roads.
3. Kadiyali LR, Principles of Highway Engineering; Khanna Publishers, New Delhi

REFERENCE BOOKS:

1. Hutchinson, B. G. Introduction to Urban Transport System Planning, McGraw Hill.
2. MJ Bruton, Introduction to Transport Planning, Hutchinson Technical Education

COURSE OUTCOMES:

After successful completion of this course, the student is expected to

1. Estimate Travel demand for an urban area

2. Plan the transportation network for a city

3. Identify the corridor and plan for providing good transportation facilities

4. Evaluate various alternative transportation facilities

A1CET316 URBAN TRANSPORT PLANNING											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√						√		√
CO-2	√		√						√		√
CO-3	√		√						√		√
CO-4	√		√						√		√

A1CET316 URBAN TRANSPORT PLANNING	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET317	SEMESTER-VII(CORE ELECTIVE VI)	L	T	P	C
	ADVANCED STRUCTURAL DESIGN	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To Impart the knowledge of designing of flat slabs and mat foundations.
2.	To teach various forces acting on retaining walls and their design.
3.	To teach the design aspects of water tanks and chimneys
4.	To outline the concepts of B and D regions

SYLLABUS:

UNIT-I (Design of Flat Slab) **Total=8hrs**

Introduction of all types of slabs, Design of flat slabs (with and without drops) by direct design method and equivalent frame method.

UNIT-II (Design of Raft foundation) **Total=10hrs**

Need for raft foundation – Design of Raft/Mat foundation for a multi storey building rectangularin plan.

UNIT-III (Design of Retaining wall) **Total=8hrs**

Introduction, types of retaining walls, Design of cantilever retaining wall.

UNIT-IV (Design of Water tanks) **Total=8hrs**

Types of water tanks – Components and their functions - Design of Intz type water tank.

UNIT-V (Design of Chimneys) **Total=10hrs**

Introduction to chimneys-parts of chimney-stress in RC shafts due to self-weight and wind loads-stresses due to temperature differences – Design of RC chimney.

UNIT-VI (Design of Special RC elements) **Total=8hrs**

B and D regions - Behaviour of non-flexural members – Design of simply supported deep-beams using IS code.

TEXT BOOKS:

1. Subramanian.N., "Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2013.
2. Advanced reinforced concrete structures by Varghese.P.C, 6th edition, Prentice Hall of India Pvt.Ltd.2005.
3. Pillai S.U and Menon D " Reinforced Concrete Design 2nd edition, Tata McGraw Hill Publishing company 2008.

REFERENCE BOOKS:

1. Reinforced Concrete Design: Principles And Practice, N. Krishnaraju and Pranesh, New age International publishers.
2. Bhavikatti S.S., "Advanced RCC Design", 4th Edition, New Age International Pvt.Ltd., 2008
3. IS 456-2000.

COURSE OUTCOMES:

After successful completion of the course, the student is expected to

1. Design flat slabs and mat foundations
2. Design Retaining walls
3. Design water tanks and chimneys
4. Distinguish B and D regions, Design deep beams using IS code

A1CET317 ADVANCED STRUCTURAL DESIGN											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET317 ADVANCED STRUCTURAL DESIGN	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET318	SEMESTER-VII(CORE ELECTIVE VI)	L	T	P	C
	HYDRO POWER ENGINEERING	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisites : Fluid Mechanics, Hydraulics & Hydraulic Machinery, Water Resources Engineering				

COURSE OBJECTIVES	
1.	To give an overview on hydropower development.
2.	To explain the fundamentals of hydropower engineering.
3.	To teach basic concepts of hydropower structures.
4.	To demonstrate the economics behind power generation.

SYLLABUS

UNIT- I (Hydro power Energy) **Total=7hrs**

Different sources of energy - Hydro power - Place of hydro power in a power system - Global and National Status of hydro power development - Famous hydro power projects in India & Abroad.

UNIT- II (Fundamentals of Hydro power Engineering) **Total=09hrs**

Fundamentals of hydro power engineering - Classification of hydro power plants - Water power estimates - Essentials of stream flow for water power studies - Pondage and storage - Effect of pondage on plant capacity - Benefits from storage

UNIT- III (Hydrology) **Total=8hrs**

Role of hydrology in hydro power - mass curve - flow duration curve - influence of reservoirs on flood flow - Load curve - load factor, utilization factor, capacity factor, diversity factor - firm power and secondary power.

UNIT- IV (Hydro power Plant & Powerhouses) **Total=8hrs**

Prediction of load - Types of hydro power plants - run off river plants, pumped storage, tidal, mini and micro hydro power plants - general arrangement of a power house - types of power houses.

UNIT- V (Hydro power Structures) **Total=9hrs**

Head race - Intakes - Penstocks - Power Canals and Tunnels - Turbines - Classification - Impulse & Reaction - Pelton Wheel, Francis & Kaplan – Generators- Fore-bay - Gates & Valves - Anchor blocks - Joints, Bends and Manifolds - Water Hammer phenomenon, occurence & estimation - Surges and Surge Tanks.

UNIT- VI (Economical Analysis of hydropower plants) **Total=7hrs**

Cost-Benefit Analysis of Hydro power plants - Cost and value of water power. Comparison other power plants in terms of financial resources and sustainability.

TEXT BOOKS:

1. M. M. Dandekar and K. N. Sharma, Water Power Engineering, Vikas Publishing House (P) Ltd.
2. P. S. Nigam, Handbook of Hydro Engineering, Nem Chand and Bros., Roorkee.
3. Guthrie Brown, Hydroelectric Engineering Practice, Blackie and Sons Ltd; London.

REFERENCES:

1. H. K. Barrows, Water Power Engineering , McGraw Hill Education.
2. R. S. Varshney, Hydro Power Structures, Nem Chand and Bros., Roorkee.
3. T. S. Bhatti, R. C. Bansal, and D. P. Kothari, Small Hydro Power Systems, Dhanpat Rai .

COURSE OUTCOMES:
After completion of the course, the student is expected to

1. Know the basic concepts of Hydro power engineering.
2. Identify the various components of hydro power plants and their respective roles.
3. Apply basic concepts of hydrology to estimate reservoir flood flow.
4. Know the economics behind hydropower plants.

A1CET318	HYDRO POWER ENGINEERING										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET318	HYDRO POWER ENGINEERING
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET319	SEMESTER-VII(CORE ELECTIVE VII)	L	T	P	C
	DESIGN AND DRAWING OF IRRIGATION STRUCTURES	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisites: Water Resources Engineering, Design of RCC				

COURSE OBJECTIVES	
1.	To explain about various types of hydraulic Structures those are required for irrigation management.
2.	To teachabout various hydraulic elements involved in the various types of hydraulic structures.
3.	To demonstrate the importance of the knowledge of structural engineering and geotechnical engineering in the complete designing of the hydraulic structures.
4.	To explain the designs and drawings of various hydraulic structures.

SYLLABUS

UNIT -I **Total=8hrs**

Design and drawing of Surplus Weir

UNIT- II **Total=8hrs**

Design and drawing of Tank Sluice with tower head

UNIT- III **Total=8hrs**

Design and drawing of Canal drop – Notch type

UNIT- IV **Total=8hrs**

Design and drawing of Canal regulator cum Road Bridge

UNIT- V **Total=8hrs**

Design and drawing of Under Tunnel

UNIT- VI **Total=8hrs**

Design and drawing of Super passage

TEXT BOOKS:

1.Water resources engineering principles and practice by C. Satyanarayana Murty, New Age International Publishers.
2.Irrigation Water Resources and Water Power Engineering' by Modi P N (2011), Standard Book House, New Delhi.
3.Irrigation Engineering' by Sharma R.K. and Sharma, T.K (2012), S. Chand & Co Publishers.

REFERENCES:

1. Irrigation engineering and hydraulic structures, S.K. Garg, Standard book house.
2. Irrigation and water resources engineering by K R Arora , Standard Publishers (2016).
3. Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.

COURSE OUTCOMES:

The student who undergo this course should be able to

1. Identify different hydraulic structures used in irrigation management
2. Distinguish the various elements of the hydraulic structure
3. Apply the principles of structural and geotechnical engineering to design hydraulic structures
4. Design and draw the hydraulic structures

A1CET319 DESIGN AND DRAWING OF IRRIGATION STRUCTURES											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√						√
CO-2	√		√		√						√
CO-3	√		√		√						√
CO-4	√		√		√						√

A1CET319 DESIGN AND DRAWING OF IRRIGATION STRUCTURES	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET320	SEMESTER-VII(CORE ELECTIVE VII)	L	T	P	C
	Environmental Impact Assessment and Management	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To teach the impacts of developmental projects on the environment
2.	To explain the socio economic impact assessment.
3.	To explain the methodologies and legal aspects of EIA.
4.	To demonstrate the EIA case studies and regulations

SYLLABUS:

UNIT-I (Introduction) **Total=6hrs**

Introduction – Basic concepts of EIA and EIS– Elements of EIA Function and purpose of EIA – Factors affecting EIA. Impact Evaluation and analysis. Preparation of environmental base map. Classification of Environmental parameters.

UNIT- II (Methodologies of EIA) **Total=8hrs**

Introduction to EIA Methodologies. Criteria for the selection of EIA methodology. EIA methods – Ad-hoc, Matrix, Network, overlay methods. Environmental Media Quality Index method, Cost-benefit Analysis.

UNIT- III (Criteria for selection of industrial site) **Total=8hrs**

Industrial Siting criteria Assessment of developmental activities such as river valley. Nuclear and thermal power plants, mining activities. Regulations for Airports, Highways, vegetation and wildlife – causes and effects of deforestation. Impact of developmental activities and Land use. Methodology for assessment of impacts on surface water, soil and groundwater, air, noise and biological environment.

UNIT- IV (Socio-economic Impact) **Total=8hrs**

Socio-economic impact – types of impacts. Steps in performing socio economic impact assessment. Public participations – resettlement and rehabilitation. Identification of mitigation measures. Assessment of impact significance and prediction.

UNIT-V (Environmental Audit) **Total=8hrs**

Environmental Audit – objectives of Audit-Types of audit – audit protocol - Stages of audit and on-site activities. Preparation and Evaluation of Audit report. Environmental management plan – post project management. EIA report and EIS – review process.

UNIT-VI (EIA Case studies and Regulations) **Total=8hrs**

Legislatives and statutory norms, Environmental clearances, Policies and programs on protection of environment-Environmental Pollution act, Air act, Water act, Wild life act. Case studies: EIA report for various industries and projects such as Sardar sarovar project, silent. Demonstration on software tools like RIAM

TEXT BOOKS:

1. Environmental Impact Assessment by Canter, McGraw Hill.
2. Environmental Impact Assessment by Y.Anjaneyulu, B.S.Publications.
3. Concepts in Environmental impact analysis by Shukla.S.K and Srivastava.P.R., common wealth publishers, New Delhi.

REFERENCES:

1. Environmental Protection 1986.
2. Environmental impact assessment by David P.Lawrence.
3. Environmental Engineering II by S.K.Garg, Khanna Publishers.
4. Environmental studies by KVSG Murali Krishna.

COURSE OUTCOMES:

After completion of the course, the student is expected to

1. Get exposure in the field of impacts on the environment.
2 Study the socio economic impact assessment.
3. Apply the methodologies and legal aspects of EIA.
4. Develop EIA audit reports

A1CET320 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√		√						√
CO-2	√		√		√						√
CO-3	√		√		√						√
CO-4	√		√		√						√

A1CET320 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET321	SEMESTER-VII(CORE ELECTIVE VII)	L	T	P	C
	Remote Sensing & GIS	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To introduce basic concepts of Aerial Photogrammetry and Remote Sensing.
2.	To explain about image processing
3.	To introduce the basic concepts of GIS and Analysis
4.	To explain about RS & GIS applications

SYLLABUS:

UNIT-I **Total=08 hrs**

Fundamentals of Aerial Photogrammetry: Introduction, Classification, Geometrical elements of vertical photograph, Scale, Relief Displacements, photo and ground coordinates, flight planning. Stereoscopic vision, Parallax bar, Measurement of heights and heights and slopes, Ground control for aerial Photography**.**

UNIT-II **Total=08 hrs**

Principles of Remote Sensing: Introduction, Sources of Energy, Electromagnetic spectrum,interaction of energy with atmosphere scattering, interaction of EMR with earth surfacefeatures- spectral signatures. Space platforms and sensors, LANDSAT, SPOT, NOAA and IRSSeries. Applications of Remote Sensing.

UNIT-III **Total=08hrs**

Image analysis: introduction, Types of data products, elements of visual interpretations, digital image processing- image preprocessing, georegistration, image enhancement, image classification- supervised classification, unsupervised classification, DEM.

UNIT- IV **Total=10 hrs**

GIS: Introduction, GIS definition, development, application areas. Map Concept- Map-Definition, Elements of Maps, Types of maps, Advantages and disadvantages of analog/digital maps, Coordinate Systems- Geometric models of earth, Global/Local coordinate system, Projection Systems. Steps in GIS project, Problem Identification and Implementation of a GIS project.

UNIT-V **Total=08 hrs**

Fundamental concepts of GIS – Modeling Real World Features- Raster data model, vector data model, TIN and DEM Data Formats- Spatial and Non-Spatial data, Data collection and Input, Data conversion. Topology – Editing and Error Rectification.

UNIT - VI **Total=06 hrs**

Spatial Analysis – Buffer Analysis, Overlay Analysis-Raster overlay operations, Vector Overlay methods, Network Analysis-Impedance, Shortest path analysis, closest facility.

TEXT BOOKS:

1. Remote sensing of the Environment by John R Jensen, Pearson Publication.
2. Remote sensing and image interpretation by Thomas M. Lillesand and Ralph W. Kiefer, John Wiley and Sons Inc.
3. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall Publications.
4. Image Processing and GIS for Remote Sensing: Techniques and Applications by Jian Guo Liu, Philippa J. Mason, Wiley Publications.

REFERENCE BOOKS:

1. Burrogh P.A., Principles of Geographical Information System for Land Resources Assessment, Oxford Publications, 1980 2. Kang-tsung Chang ,
2. Introduction to Geographical Information System, , Fourth Edition, Tata McGraw Hill,2008 3. Pinde Fu and Jiulin Sun,Web GIS: Principles and applications, ESRI, 2010.
3. Remote Sensing and Geographical Information systems by M. Anji Reddy JNTU Kakinada 2001, B.S.Publications.

COURSE OUTCOMES:

After successful completion of this course the student is expected to

1. Know the basic concepts of Aerial Photogrametry and Remote Sensing
2. Do the analysis of the images
3. Know the basic concept of GIS
4. Familiar with the concepts spatial analysis

A1CET321 Remote Sensing & GIS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√				√		√
CO-2	√				√				√		√
CO-3	√				√				√		√
CO-4	√				√				√		√

A1CET321 Remote Sensing & GIS	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET322	SEMESTER-VII[CORE ELECTIVE VIII (Self Study)]	L	T	P	C
	RURAL ROADS	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Transportation Engineering				

COURSE OBJECTIVES	
1.	To teach the importance and problems associated with rural roads.
2.	To explain design procedures of low cost rural roads.
3.	To explain geometric design standards of rural roads.
4.	To emphasize on sustainability through use of recycled road materials.

SYLLABUS:

UNIT-I (Introduction to Rural Roads) **Total=8hrs**

Concept, Objective, Scope and coverage of low cost and rural roads, Definition and distinctions between rural roads and highways, Significance of low cost roads for developing countries with special reference to India, Indian scenario- road development plans of GoI, PMGSY- Phase I,II,III, NRRDA.

UNIT-II (Planning and Alignment) **Total=8hrs**

Planning of rural roads, Concept of Network Planning, rural roads plan, road alignment and surveys, governing factors for route selection, Rural Road Planning and Investment, State of art review of existing practices and their deficiencies in rural road planning, Socio-economic aspects in planning. Preparation of rural road master plans and their evaluation, Stage construction, planning, and utilization of successive investments .

UNIT-III (Geometric Design Standards) **Total=8hrs**

Classification of rural roads, basic principles of geometric design, standards for design of various geometric components, Road Materials: Soil, sub-grade, stabilized soils, road aggregates, binding material.

UNIT-IV (Pavement Design) **Total=8hrs**

Design parameters, pavement components, design of flexible, rigid, and semi-rigid pavements, drainage and shoulders.

UNIT-V (Construction and Specifications) **Total=8hrs**

Selection of materials and Methodology, Embankment and sub-grade, sub-base, base course, shoulder, bituminous constructions, semi-rigid pavement construction, Concrete pavements, equipment required for different operations.

UNIT-VI (Use of Waste Materials) **Total=8hrs**

Fly ash for road construction, Lime fly ash stabilized soil, lime fly ash bound macadam, lime fly ash concrete, roller compacted flay ash concrete. Cement blended with fly ash, iron and steel slag, Lime-rice husk ash concrete, recycled concrete aggregate. Introduction to quality control in construction of rural roads and their maintenance.

TEXT BOOKS:

1. Khanna S.K., And Justo C.E.G - Highway Engineering – Nem Chand Bros., Roorkee.

REFERENCE BOOKS:

1. IRC SP 20: Rural Roads Manual, Indian Roads Congress, New Delhi, 2002.

COURSE OUTCOMES:

1. Know importance and problems associated with rural roads.
2. Design low cost rural roads.
3. Know geometric design standards of rural roads.
4. Give importance to sustainability through use of recycled road materials.

A1CET322 RURAL ROADS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√						√
CO-2	√				√						√
CO-3	√				√						√
CO-4	√				√						√

A1CET322 RURAL ROADS	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CET323	SEMESTER-VII[CORE ELECTIVE VIII (Self Study)]	L	T	P	C
	SOLID WASTE MANAGEMENT	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Environmental Studies				

COURSE OBJECTIVES	
1.	To explain different types of sources, generation, collection and transport of solid waste
2.	To explain processing, and disposal methods of solid wastes.
3.	To teach the merits and demerits of various methods of disposal
4.	To demonstrate the disposal options for the solid waste.

SYLLABUS:

UNIT-I **Total=8hrs**

Introduction – Definitions of Solid wastes – garbage - rubbish , Sources of Solid wastes, Types of solid waste – characteristics , Waste generation – handling methods , Effects due to improper disposal.

UNIT-II **Total=8hrs**

Collection – Transfer – Transport of wastes, Segregation of wastes, Recovery & Recycling of wastes, Functional elements of solid waste management.

UNIT-III **Total=8hrs**

Residential and industrial wastes, Collection methods, Collection vehicles – manpower – collection routes, Transfer stations – selection of location, Operation and maintenance.

UNIT-IV **Total=8hrs**

Physical processing – Volume reduction, Open dumping, Incineration – methods – advantages and disadvantages. Composting – methods – advantages and disadvantages

UNIT-V **Total=8hrs**

Land filling methods, Design and operation of landfills, Land farming – deep well injections, Leachate management.

UNIT-VI **Total=8hrs**

Hazardous waste – Definition – Classification – generation, Toxicology – bio-medical wastes. Physico-chemical process – biological methods. Stabilization and solidification - Thermal methods, Land disposal – remedial measures.

TEXT BOOKS:

1. Integrated solid waste management by Tchobanognous, Theisen and Vigil, McGraw Hill.
2. Hazardous waste management by Lagrega et al.
3. Environmental engineering by Howard S. Peavy, Donald R Rowe, and George Tchobanognous, McGraw Hill.

REFERENCES:

1. Municipal solid wastes – problems and solutions by R.E.Landreth and P.A.Rebers, Lewis Publishers.
2. Manual on Municipal solid waste management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi 2000.
3. Environmental pollution control engineering by C.S.Rao, Willey Eastern Ltd.

COURSE OUTCOMES:

After completion of the course, the student is expected to

1. Know different types of sources, generation, collection and transport of solid waste
2. Aware of processing and disposal methods of solid wastes.
3. Know merits and demerits of various methods of disposal
4. Apply the knowledge to identify the disposal options for the solid waste.

A1CET323 SOLID WASTE MANAGEMENT											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√								√		√
CO-2	√								√		√
CO-3	√								√		√
CO-4	√								√		√

A1CET323 SOLID WASTE MANAGEMENT	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council,

A1CEL209	SEMESTER-VII	L	T	P	C
	GIS & CAD Lab	0	0	3	2
	Total Contact Hours – 36				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To explain the basics of GIS software
2.	To gain expertise in designing and creating GIS software applications using GIS developer components.
3.	To teach the basics of STAAD.Pro and to introduce the interface
4.	To explain the analysis and design of pin jointed and rigid jointed plane and space frame using STAAD.Pro

SYLLABUS

GEOGRAPHYCAL INFORMATION SYSTEM (GIS)

EXERCISES IN GIS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering

COMPUTER AIDED DESIGN AND DRAWING:

EXERCISES:

1. Analysis and Design of Continuous Beam
2. Analysis and Design of RCC Portal Frame
3. Analysis and Design of Plane truss for Dead Load, Live Load and Wind Load
4. Analysis and Design of Multistory rigid jointed space frame for Dead Load, Live Load and Wind Load
5. Analysis and Design of Space truss for Dead Load and Wind Load

References:

1. Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.
2. Design of Reinforced Concrete Structures by Subramanian, N, Oxford University Press, New Delhi, 2013.

OUTCOMES:

After successful completion of this course, the student is expected to

1. Work comfortably on GIS software
2. Digitize and create thematic map and extract important features
3. Develop digital elevation model
4. Use structural analysis and design software to analyze and design rigid jointed plane and space frame for different types of loading
5. Use structural analysis and design software to analyze and design pin jointed plane and space framefor different types of loading

A1CEL209GIS & CAD Lab											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√	√									√
CO-2	√	√									√
CO-3	√	√									√
CO-4	√	√									√

A1CEL210GIS & CAD Lab	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by:

A1CEL210	SEMESTER-VII	L	T	P	C
	Environmental Engineering Lab	0	0	3	2
	Total Contact Hours – 36				
	Prerequisite :				

COURSE OBJECTIVES	
1.	To demonstrate the important tests for estimating water and waste water quality parameters
2.	To provide hands on practice for inferring the standards of the water based on test results.

SYLLABUS

LIST OF THE EXPERIMENTS

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil
2. Determination of Calcium Hardness
3. Determination of Total Hardness – Calcium & Magnesium
4. Determination of Alkalinity
5. Determination of Acidity
6. Determination of Chlorides in water
7. Determination of Total, Dissolved and Suspended solids in water
8. Determination of Iron in water
9. Determination of Physical properties – Temperature, Colour, Odour and Turbidity
10. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method
11. Determination of BOD/COD
12. Determination of Optimum coagulant dose
13. Determination of Chlorine demand

Note: At least 10 of the above experiments are to be conducted

References:

1. Standard Methods for Analysis of Water and Waster Water -APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi
3. Relevant IS codes
4. Chemistry for Environmental Engineering by Sawyer and Mc.Carty

COURESE OUTCOMES:

After successful completion of this course, the student is expected to

1. Estimate some important characteristics of waste and wastewater in the laboratory
2. Draw some conclusion and decide whether the water is potable or not
3. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
4. Estimation of the strength of the sewage in terms of BOD and COD

A1CEL210 Environmental Engineering Lab											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√	√									√
CO-2	√	√									√
CO-3	√	√									√
CO-4	√	√									√

A1CEL210 Environmental Engineering Lab	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by:

A1CET401	OPEN ELECTIVE-I (OFFERED TO OTHER BRANCHES)	L	T	P	C
	PROJECT PLANNING AND MANAGEMENT	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : None				

	COURSE OBJECTIVES
1	To introduce the concepts of Project Planning, Project Management, Scheduling and Controlling
2	To explain the techniques of construction of networks, network elements and development also identification.
3	To introduce the competencies in project costing, budgeting, and financial appraisal
4	To outline the importance and necessity of management information systems.

SYLLABUS

UNIT I (Introduction) **Total=08hrs**

Project Planning, Project Management, Scheduling and Controlling- Introduction to methods of planning and scheduling.

UNIT II (PERT) **Total=08hrs**

Elements of Networks – Event, Activity, and Dummy Activity – Guidelines for the construction of the network – Development of PERT network – Numbering.

Critical Path – Slack – Identification of Critical Path – Probability of Completion of projects.

UNIT III (CPM) **Total=08hrs**

Construction of network – Earliest Possible Occurrence time and Latest Possible Occurrence time – Start and Finish times of activities – Floats – Identification of Critical Path using floats.

UNIT IV (Updating) **Total=08hrs**

Data required for updating – Process of updating – When to update. Resource allocation – Resource Smoothing – Resource levelling.

UNIT V (Project Management) **Total=08hrs**

The role of Management in Project environment – Scope of the Construction Management, Significance of Construction management, Concept of Scientific Management, Qualities of Manager. Different financial models like PPP, BOOT etc.,

UNIT VI (Management Information Systems) **Total=08hrs**

Importance of Management Information Systems (MIS), Logical Foundation of MIS, Classification of Information Systems and Impact of construction work on Management Information Systems. Introduction to tools like MS project, PRIMAVERA etc.,

TEXT BOOKS:

1. Project Planning and Control with PERT & CPM by B.C. Punmia & K.K. Khandelwal, Laxmi Publishers.
2. Construction Management and Planning – Guna and Sengupta, B.
3. 'Construction Project Management Theory and Practice' by Kumar Neeraj Jha, Pearson publishers (2011).

REFERENCE BOOKS

1. Robert Schulte's, Mary Sumner. (1999). "Management Information Systems - The Manager's View". Tate McGraw Hill Edition, New Delhi.
2. Construction Project Management - An Integrated Approach' by Peter Fewings, Taylor and Francis.
3. 'Construction Management Emerging Trends and Technologies' by Trefor Williams, Cengage learning.

OUTCOMES

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

1. Practice the process of project management and its application in delivering successful projects;
2. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities;
3. Identify the resources required for a project and to produce a work plan and resource schedule;
4. Plan and complete a project with PERT and CPM techniques with available resources.

A1CET401	PROJECT PLANNING AND MANAGEMENT										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√			√	√						√
CO-2	√			√	√						√
CO-3	√			√	√						√
CO-4	√			√	√						√

A1CET401	PROJECT PLANNING AND MANAGEMENT
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET402	OPEN ELECTIVE-I (OFFERED TO OTHER BRANCHES)	L	T	P	C
	AIR POLLUTION AND ITS CONTROL	3	0	0	3
	Total Contact Hours – 48 (L)				
	Prerequisite : Environmental Studies				

COURSE OBJECTIVES	
1.	To impart knowledge about the fundamentals aspects of air and noise pollution.
2.	To introduce some aspects of modelling of air pollution in the atmosphere.
3.	To provide insight into different methods used for controlling particulate and gaseous pollutants.
4	To teach the ambient air quality standards and explain the methods to measure the air quality levels.

SYLLABUS

UNIT I (Introduction) **Total=08hrs**

Introduction – Definitions of Air Pollution - Source and Classification of Air Pollution, Effects of Air pollution on Human, Animals, Vegetation and materials. Global effects – case studies. Legislatives and Air pollution survey.

Unit II (Dispersion Modelling) **Total=08hrs**

Meteorology – atmosphere and wind movements – wind rose diagrams. Adiabatic lapse rates – Inversion lapse rates. Plume behaviour – measurement of meteorological variables. Dispersion and modelling theories of air pollutants – Gaussian model. Plume rise equations – effective stack height and mixing depths.

Unit III (Control of Particulate matter) **Total=08hrs**

Control of particulate matter – sources and process changes. Atmospheric sampling methods and stack sampling methods. Types of particulate pollution control methods - Settling chambers – Cyclone separators – Scrubbers - Filters – Electrostatic Precipitators.

Unit IV (Gaseous and automobile pollution) **Total=08hrs**

Gaseous Pollution control methods and auto-mobile pollution. Types of pollution control methods – Adsorption, absorption and combustion. Vehicular emission norms. Automobile pollution sources. Composition of auto exhausts. Controlling methods.

Unit V (Ambient Air Quality) **Total=08hrs**

Ambient air quality monitoring. Monitoring and controlling of Suspended particulate matter, SO, NO, CO. Stack Monitoring for flue gases. Micro-meteorological monitoring. Emission standards.

Unit VI (Noise Pollution) **Total=08hrs**

Noise Pollution – sources – predicting – controlling and prevention methods, Measurements and monitoring of dB levels. Policies and Noise act. Case studies.

TEXT BOOKS:

1. Air pollution by M.N. Rao and H.V.N. Rao – Tata McGraw Hill.
2. Environmental pollution control engineering by C.S. Rao, Willey Eastern Ltd.
3. Air Pollution Control Engineering, Noel de Nevers, Waveland Press Inc.

REFERENCE BOOKS

1. Air pollution and control by KVSG Murali Krishna
2. Environmental Engineering II by S.K. Garg, Khanna Publishers.
3. Fundamentals of Air Pollution Engineering, Richard C. Flagan, Dover Publications

OUTCOMES:

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

1. Decide the ambient air quality based on the analysis of air pollutants.
2. Judge the plume behaviour in a prevailing environmental condition
3. Design particulate and gaseous control measures for an industry.
4. Apply the concept of ambient air quality in maintaining the air pollutant levels in the atmosphere

A1CET402	AIR POLLUTION AND ITS CONTROL										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√			√	√			√		√	√
CO-2	√			√	√			√		√	√
CO-3	√			√	√			√		√	√
CO-4	√			√	√			√		√	√

A1CET402	AIR POLLUTION AND ITS CONTROL
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: Meeting of Academic Council, held on

A1CET403	OPEN ELECTIVE-I (OFFERED TO OTHER BRANCHES)	L	T	P	C
	ROAD SAFETY ENGINEERING	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : None				

COURSE OBJECTIVES	
1.	To explain different types of road accidents and causes
2.	To outline the road transport policies to prevent accidents
3.	To demonstrate road safety auditing techniques
4.	To teach prioritizing of road safety improvement methods

SYLLABUS

UNIT I (Road Safety Policy-I) **Total=08hrs**

The scale and nature of the road accident problem in the India and how it compares internationally; road safety responsibilities; definition of road accidents; and accident causation.

Unit II (Road Safety Policy-II) **Total=08hrs**

Role of road safety in national and local transport policy, managing the safety process, urban and rural road safety management, road safety research and recent road safety developments with special emphasis on pedestrian safety.

Unit III (Collision Prevention and Reduction-I) **Total=07hrs**

Road accidents, causes, recorded cases, method of recording. Accident data, storing of accident data, the use of accident data and interpretation of accident data.

Unit IV (Collision Prevention and Reduction-II) **Total=09hrs**

Selecting and prioritizing locations for investigation, statistical analysis of accidents, in depth analysis of individual locations, defining the road accident problem, difference between site and route analysis, area wide road safety schemes, options for treating accident problems, monitoring the effectiveness of measures and estimating accident savings and economic benefits, Importance of road markings, Traffic signs and signals, Traffic control devices.

Unit V (Safety Audits-I) **Total=08hrs**

The Road safety Audit procedure, and what are aims and objectives, roles and responsibility; history of road safety audit, road safety audit and design standards, road safety audit tasks, various stages of safety audits; common identifiable problems.

Unit VI (Safety Audits-II) **Total=08hrs**

Structure of a road safety audit report, identify common problems. Case studies and site visit; what to look for on-site visits.

TEXT BOOKS

1. Highway Engineering by Khanna S.K, and Justo C.E.G -Nem Chand Bros., Roorkee.
2. Traffic Engineering by Kadiyali LR, Khanna Publishers, New Delhi.
3. Practical Road Safety Auditing, 3rd edition, Martin Belcher, Steve Proctor and Phil Cook

REFERENCE BOOKS

1. Fundamentals of Transportation Engineering by Papacostas C.S. - Prentice Hall of India Pvt. Ltd; New Delhi.
2. Principles of Traffic and Highway Engineering by Nicholas J. Garber, Lester A. Hoel, Cengage Learning.
3. IRC SP 088: Manual on Road Safety Audit

OUTCOMES:

After successful completion of this course, the student is expected to

1. Identify different types of road accidents and causes
2. Know the road transport policies to prevent accidents
3. Conduct road safety audits
4. Evaluate accident hot spots and recommend corrective measures

A1CET403	ROAD SAFETY ENGINEERING										
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√				√	√			√		√
CO-2	√				√	√			√		√
CO-3	√				√	√			√		√
CO-4	√				√	√			√		√

A1CET403	ROAD SAFETY ENGINEERING
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21-01-2017
	Ratified by: 1st Meeting of Academic Council, held on

A1CET404	OPEN ELECTIVE-II (OFFERED TO OTHER BRANCHES)	L	T	P	C
	TRAFFIC ENGINEERING	3		0	3
	Total Contact Hours – 48(L)				
	Prerequisite: None				

COURSE OBJECTIVES	
1.	To explain different traffic flow variables and their measurement.
2.	To explain the theory and modules behind traffic simulation.
3.	To teach the principles behind traffic signal control.
4.	To outline the management of different road user groups.

SYLLABUS

UNITI (Introduction to Traffic Engineering) Total=08hrs

Road user characteristics, human and vehicle characteristics; Traffic Stream Characteristics: speed, density, volume, travel time,`` headway, spacing, time-space diagram, time mean speed, space mean speed and their relation, relation between speeds, flow, density, fundamental diagrams.

Unit II (Traffic Measurement Procedures) Total=08hrs

Measurement at a point: Traffic volume measurement, equipment for flow measurements, data analysis, concepts of ADT, AADT; Measurement over a short section: Speed measurements, 15^{th}, 85^{th} and 98^{th} percentile speeds, design speed, speed distributions; Measurement along a length of road: Density measurement, speed-delay studies; Automated traffic measurement: GPS devices, loop detectors, video analysis, and other technologies.

Unit III (Microscopic Traffic Flow Modelling) Total=08hrs

Vehicle arrival models: Poisson distribution, headway modeling, random vehicle generation; Microscopic traffic simulation: Vehicle generation, design, calibration, validation, applications, operational models.

Unit IV (Uninterrupted Flow) Total=08hrs

Capacity and Level of service LOS: Definitions, highway capacity, factors affecting LOS, HCM methods; Urban Street: Classification, operational performance measures, congestion management; Multilane highways: Characteristics, capacity and level of service; Freeway operations: Operational considerations, capacity and level of service of a basic freeway segment, weaving operation.

Unit V Traffic Intersection Control Total=08hrs

Principles of traffic control: Requirements, basic driving rules, priority movements, principles of traffic control, intersections conflicts; Traffic Control Devices: Signs, Markings and Signals, Uncontrolled intersection: Level of service concept, priority streams, conflicting traffic, critical gap and follow-up time, capacity, queue length, control delay; Channelization: channelizing devices, geometrical aspects, turning radius; Traffic rotary: Conflict resolution in a rotary, geometric layout, design elements, practical capacity of rotary; Grade separated intersection: Road over bridges, under pass, overpass, trumpet interchange, diamond interchange, fully and partial clover leaf intersection.

Unit VI (Traffic Signal Design) **Total=08hrs**

Elements of traffic signal: Definitions, analysis of critical headway, saturation flow, lost time, critical flows, derivation of cycle length; Design principles of a traffic signal: Phase design, cycle time determination, green splitting, pedestrian phases, and performance measures; Evaluation of a traffic signal: Definitions and measurement of stopped and control delay, Webster's delay model, oversaturated conditions; Coordinated traffic signal: Concepts of offset, common cycle length bandwidth, offset for one-way and two way streets ; Vehicle actuated signals and Area traffic control: Basic principles of vehicle actuation, collection of data, system architecture and algorithms.

Text Books

1. Traffic Engineering and Transport Planning- L. R. Kadiyali.
2. Principles of Highway Engineering; Kadiyali LR, Khanna Publishers, New Delhi.
3. Principles of Transportation Engineering- Partha Chakraborthy and Animesh Das, PHI Publishers.

Reference Books

1. Papacostas C.S. - Fundamentals of Transportation Engineering - Prentice Hall of India Pvt.Ltd; New Delhi.
2. Nicholas J. Garber, Lester A. Hoel, Principles of Traffic and HighwayEngineering, Cengage Learning.
3. IRC SP 044: Highway Safety Code

OUTCOMES:

After successful completion of this course, the student is expected to

1. Plan, design and maintain a railway track and its elements.
2. Design safe train operating systems and procedures.
3. Plan, design and maintain various elements of Airports.
4. Plan, design and maintain various elements of Ports and Harbours.

A1CET404 TRAFFIC ENGINEERING											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	C	d	e	f	g	h	i	j	k
CO-1	√		√		√	√					√
CO-2	√		√		√	√					√
CO-3	√		√		√	√					√
CO-4	√		√		√	√					√

A1CET404 TRAFFIC ENGINEERING	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET405	OPEN ELECTIVE-II (OFFERED TO OTHER BRANCHES)	L	T	P	C
	DISASTER MANAGEMENT	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Environmental science				

COURSE OBJECTIVES	
1.	To explain various Natural and Manmade Disasters and their causes
2.	To teach the Preparedness and Mitigation measures for various disasters
3.	To outline various disaster resistant construction practices
4.	To explain the concepts of Vulnerability and Risk and mention modern technology involved in predicting disasters

SYLLABUS

Unit I (Concept of Disaster Management) **Total=09hrs**

Introduction- Types of Hazard- Natural and manmade; Disaster Management cycle; Relationship between disaster and human development; Case studies related to Indian disasters, Disaster Management Act 2005.

Unit II (Disaster Scenario in India) **Total=08hrs**

Introduction- Hazard scenario in India; Causes, effects and magnitudes of various disasters; Vulnerability zone mapping of India- Earthquake, Cyclone, Flood, Drought, Landslide; Urban settlements and townships.

Unit III (Preparedness and Mitigation) **Total=08hrs**

Introduction- Preparedness, Mitigation & Prevention; Rescue and relief measures; Rehabilitation and Recovery; Public awareness; Disaster Education; Disaster mitigating agencies and their organizational structure at different levels.

Unit IV (Risk and Vulnerability) **Total=07hrs**

Introduction- Vulnerability, Social and environmental vulnerabilities; Risk; land use planning in cities; Sustainable development; Climate change- related problems.

Unit V (Role of Technology) **Total=08hrs**

Disaster management for Infrastructures, electrical substations, treatment plants, roads and bridges; Technology in predicting disasters- cyclone, earthquake, landslide, drought and flood.

Unit VI (Disaster Resistant Techniques) **Total=08hrs**

Disaster resistant construction- cyclone, flood and earthquake; Role of Engineers and insurance sector; Role of knowledge based expert system in hazard scenario.

Text Books:

1. Disaster Science and Management, by Tushar Bhattacharya, Tata McGraw Hill Education Pvt Limited.
2. 'Disaster Management', by D.B.N. Murthy, Deep & Deep Publications Pvt limited.
3. 'Disaster Management – Global Challenges and Local solutions', by Rajib shah & R R Krishnamurthy (2009), CRC press.

References:

1. 'Environmental Geography', by Savindra Singh, Pravalika Publications.
2. 'Disaster Management Future Challenges and Opportunities', by Jagbir Singh, I.K. International Publishing House.
3. 'Natural Hazards and Disaster Management: Vulnerability and Mitigation', by R.B.Singh, Rawat Publications.

OUTCOMES

After successful completion of this course the student is expected to
1. Know the causes for various natural and manmade disasters
2. Take the proper measure for design of disaster resistant buildings
3. To know the modern technology in disaster prediction
4. Apply the knowledge gained for preparedness and mitigation measures for disasters

A1CET405 DISASTER MANAGEMENT											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√		√	√		√		√		√	
CO-2	√		√	√		√		√		√	
CO-3	√		√	√		√		√		√	
CO-4	√		√	√		√		√		√	

A1CET405 DISASTER MANAGEMENT	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

A1CET406	OPEN ELECTIVE-III (OFFERED TO OTHER BRANCHES)	L	T	P	C
	Applications of RS & GIS	3	0	0	3
	Total Contact Hours – 48(L)				
	Prerequisite : Physics				

COURSE OBJECTIVES	
1.	To introduce the basic principles of Remote Sensing
2.	To introduce the basic concepts of GIS
3.	To explain about RS & GIS applications
4.	To outline the advances in GIS

SYLLABUS

UNIT I (Introduction to Remote Sensing) **Total=10 hrs**

Basic components of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, passive sensor, active sensor, airborne remote sensing, space borne remote sensing**,** History of Indian Remote Sensing.

UNIT II (Geographic Information System) **Total=09hrs**

Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data models, raster versus vector.

UNIT III (RS and GIS Applications I) **Total=08 hrs**

Land cover and land use, agriculture, forestry, geology, geomorphology.

UNITIV (RS and GIS Applications II) **Total=07 hrs**

Water Resources, Disaster Management, Ocean and Meteorology.

UNITV (RS and GIS applications III) **Total=07 hrs**

Urban applications, Rural Development, Navigation.

UNIT VI (Advances in GIS) **Total=08 hrs**

3D GIS, Web Mapping, OGC-framework of open web mapping, importance of open web mapping, Mobile GIS, RS & GIS software.

TEXT BOOKS:

1. Remote sensing of the Environment by John R Jensen, Pearson Publication.
2. Remote sensing and image interpretation by Thomas M. Lillesand and Ralph W. Kiefer, John Wiley and Sons Inc.
3. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.

REFERENCE BOOKS:

1. Burrogh P.A., Principles of Geographical Information System for Land Resources Assessment, Oxford Publications, 1980
2. Kang-tsung Chang, Introduction to Geographical Information System, , Fourth Edition, Tata McGraw Hill, 2008
3. Pinde Fu and JiulinSun, Web GIS: Principles and applications, ISBN:9781589482456, ESRI, 2010.
4. M. Anji Reddy, Remote Sensing and Geographical Information systems, B.S. Publications.

OUTCOMES:

After successful completion of this course, the student is expected to

1. Know the basic concepts of Remote Sensing
2. Know the basic concepts of GIS
3. Apply the knowledge of RS & GIS for practical problems
4. Know advanced concepts of GIS

A1CET406 Applications of RS & GIS											
Course Designed by	Department of Civil Engineering										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
CO-1	√			√	√				√		√
CO-2	√			√	√				√		√
CO-3	√			√	√				√		√
CO-4	√			√	√				√		√

A1CET406 Applications of RS & GIS	
Course Designed by	Department of Civil Engineering
Approval	Approved by: Meeting of Board of Studies held on 21.01.2017
	Ratified by: 1st Meeting of Academic Council,

FOUNDATION ELECTIVES

A1EHT101	FOUNDATION ELECTIVE	L	T	P	C
	PROFESSIONAL COMMUNICATION	3			3
	Total Contact Hours – 45				
	Prerequisite: ENGLISH LANGUAGE PRACTICE –I & II.				

COURSE OBJECTIVES	
COBJ1	Students apply the principles and functions of corporate communication.
COBJ2	Students receive input on various business and professional genres that serve as a basis for completion of their letter, short business report, meeting simulation and minutes of a meeting.
COBJ3	Students analyze effective written and spoken communication in organizations.
COBJ4	Acquiring the skills required from linguistic perspective for preparing themselves for their prospective careers in business and management domain.

Unit – I **6 hrs**

- Process of communication
  - Channels & media of communication
  - Communication network
  - Facilitation & barriers to effective communication
  - Inter cultural Communication
  - Nonverbal Communication.
  - Ethics and Communication

Unit- II **5 hrs**

- Mechanics of Writing
  - Transitions
  - Spelling rules
  - Hyphenation
  - Transcribing numbers
  - Abbreviating technical and non-technical terms
  - Proof reading
- Vocabulary for Specific Purposes

Unit-III **7 hrs**

- Developing written & Analytical skills
  - Use of graphics
  - Business Communication
  - Report writing

Unit-IV **9 hrs**

- Oral Communication skills
  - Presentation skills Interviewing
  - Assertiveness training
  - Public Communication

Unit –V **8 hrs**

- Organizational Communication
  - Small Group Communication
  - Communicating with Employees
  - In Company Communication Barriers & facilitations,
  - Meeting and Committees
  - Discussion groups & briefing sessions
  - Public relations Social aspect of Communication
  - Press announcements

Unit-VI **7hrs**

- Communication Technology
  - Implications of new communication technology
  - Automated Office Impact of Computers in Business
  - Computer Crime
  - Data Protection Teleworking from home

Total Number of Hours per Course - 45

Books:

1. Argenti, P. A. (2013). Corporate Communication 6th Edition. New York: Irwin McGraw Hill, Inc.
2. Hill &Bovee, Business Communication (McGraw Hill).

REFERENCE BOOKS

1.	Lesikar&Pettet, Business Communication, (All India 'Travellers Book Sellers)
2	Korlahalli: Business Communication, Sultan Chand & Sons
3	Rai&Rai, Business CommunicationHimalays Publishing house
4	G. Danta, Information in Enterprise (Prentice Hall of India)
5	All about Words by Maxwell Nurnberg (Author), Morris Rosenblum (Author), GOYAL SAAB
6	Technical Communication- A Practical Approach by William Sanborn Pfeiffer and TVS Padmaja, Pearson Publications
7	Interview Skills that **Win** the **Job by** MICHAEL SPIROPOULOS, Allen and Unwin
8	Art of Public Speaking by Dale Carnegie,
9	Teach Yourself Speed Reading by Tina Konstant
10	Argenti, P. A. (2013). Corporate Communication 6th Edition. New York: Irwin McGraw Hill, Inc.
11	Cornelissen, J. (2011). Corporate Communication: A Guide to Theory and Practice (3rd ed.). Sage.
12	Ellet, W. (2007) The Case Study Handbook: How to Read, Discuss, and Write Persuasively About Cases. Harvard Business School Press.
13	Locker, K. O. &Kienzler, D. (2012). Business and Administrative Communication with Connect Plus (10th ed.), New York: McGraw-Hill.
14	Maier, S. (2012). The Diary: 100 Days and Lessons in Corporate Communications. Marshall Cavendish Business.
15	Netzley, M., & Snow, C. (2001). Guide to Report Writing. Upper Saddle River, NJ: Prentice Hall.
16	Oliver, S. (1997). Corporate Communication: Principles, Techniques and Strategies. London: Kogan Page.
17	Tuck, A (ed.) (2000). Oxford Dictionary of Business English for Learners of English. UK: OUP.

Course Outcomes:

CO1	Student shall understand the significance of cultural front in communication and obtain the ability to communicate effectively at cross cultural fronts
CO2	The teaching and learning activities encompass three major aspects including foundations of business and organizational communication, and planning and composing business messages. Students shall apply this skill set when writing e-mails, memos, letters, minutes of a meeting and a short business report.
CO3	Student acquires effective public speaking skills
CO4	Students apply appropriate written and spoken skills in a variety
CO5	Student prepares himself for combating the future requirements of the employment
CO6	Student shall be able to understand and analyze the core components of his study well

A1EHT101 – PROFESSIONAL COMMUNICATION											
Course designed by	English and Humanities										
CO / PO mapping (SIZE:12)	a	b	c	d	e	f	g	h	i	j	k

A1EHT101 – PROFESSIONAL COMMUNICATION

Course designed by	English and Humanities
Approval	Approved by: Meeting of Board of Studies held on 18th June, 2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1EHT102	FOUNDATION ELECTIVE	L	T	P	C
	BUSINESS COMMUNICATION	3			3
	Total Contact Hours – 45				
	Prerequisite: ENGLISH LANGUAGE PRACTICE –I & II.				

COURSE OBJECTIVES	
COBJ1	Understand the concepts of high context culture and low context culture, as well as their implications for business intercultural communication.
COBJ2	Acquire the necessary writing techniques for writing effective business documents based on communication functions, such as positive messages, negative messages, persuasive messages, and business report.
COBJ3	Communicate effectively by analyzing audience, organizing deliverances to the need and purpose, preparing clearly and precisely with no grammar errors and presenting them with skillful design.
COBJ4	Acquiring the skills required from linguistic perspective for preparing themselves for their prospective careers in business and management domain.

ORIENTATION -3 hrs

Unit – I

- The Seven Cs of Effective Communication -6 hrs
  Completeness
  - Conciseness
  - Consideration
  - Concreteness
  - Clarity
  - Courtesy
  - Correctness
- Mechanics of Writing
  - Transitions
  - Spelling rules
  - Hyphenation
  - Transcribing numbers
  - Abbreviating technical and non-technical terms
  - Proof reading
  - Vocabulary for Specific Purposes

Unit- II **5 hrs**

- Communication: Its interpretation
  - Basics
  - Nonverbal Communication
  - Barriers to Communication

Unit-III **7 hrs**

- Business Communication at Work Place:
  - Letter Components and Layout
  - Planning a letter Process of Letter writing
  - E-mail Communication, Memo and Memo reports
  - Employment Communication
    Cover letters
    Resumes
  - Notice agenda and Minutes of meeting
  - Brochures

Unit-IV **8 hrs**

- Report Writing
  - Effective writing
  - Types of business reports
  - Structure of reports
  - Gathering information
  - Organization of the material
  - Writing abstracts and summaries
  - Writing definitions
  - Visual aids
  - User instruction manual.

Unit –V **7 hrs**

- Required Skills
  - Reading skills
    - Speed Reading Techniques
    - Reading with Understanding
    - Critical/Analytical Reading
  - Listening skills
  - Note-making
  - Précis writing
  - Audiovisual aids

Unit-VI **9hrs**

- Oral Presentation
  - Public Speaking
  - Paper Presentations
  - Interview Skills

Total Number of Hours per Course - 45

Books:

1. Effective Business Communication by Herta A Murphy, Herbert W Hildebrandt, Jane P Thomas, McGraw Hill
2. Communication Skills by Sanjay Kumar, PushpLata, Oxford Publications

REFERENCE BOOKS

1.	Business Communication, Lesikar and Petit, McGraw Hill
2	Communication Skills Handbook, Summers, Wiley, India
3	Business Communication (Revised Edition), Rai and Rai, Himalaya Publishing House
4	Business Correspondence and Report Writing by R. C. Sharma and Krishna Mohan, Tata McGraw Hill.
5	All about Words by Maxwell Nurnberg (Author), Morris Rosenblum (Author), GOYAL SAAB
6	Technical Communication- A Practical Approach by William Sanborn Pfeiffer and TVS Padmaja, Pearson Publications
7	Interview Skills that Win the Job by MICHAEL SPIROPOULOS, Allen and Unwin
8	Art of Public Speaking by Dale Carnegie,
9	Teach Yourself Speed Reading by Tina Konstant

Course Outcomes:

CO1	Student shall understand the significance of cultural front in communication and obtain the ability to communicate effectively at cross cultural fronts
CO2	Student shall acquire the necessary writing techniques for writing effective business documents
CO3	Student acquires effective public speaking skills
CO4	Student enriches his linguistic knowledge from professional perspective
CO5	Student prepares himself for combating the future requirements of the employament
CO6	Student shall be able to understand and analyze the core components of his study well

A1EHT102 – BUSINESS COMMUNICATION											
Course designed by	English and Humanities										
CO / PO mapping (SIZE:12)	a	b	c	d	e	f	g	h	i	j	k

A1EHT102 – BUSINESS COMMUNICATION

Course designed by	English and Humanities
Approval	Approved by: Meeting of Board of Studies held on 18th June, 2015
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1MET103	FOUNDATION ELECTIVE	L	T	P	C
	MATERIALS SCIENCE	3	0	0	3
	Total Contact Hours - 42				
	Prerequisite : None				
COURSE OBJECTIVES					
1.	To learn about various types of bonds in crystalline solids, crystal systems, crystalline planes and directions and basic defects in crystalline materials.				
2.	To gain knowledge on the differences between conducting solids and dielectrics and the behavior of dielectrics in presence of ac fields and temperature.				
3.	To gain knowledge on the characteristics of superconducting state, types of superconductors and their applications in specific to SQUID's.				
4.	To gain knowledge about the technologically useful dielectric, magnetic and nanomaterials, their properties and applications and the preparation of nanomaterials.				
5.	To gain knowledge on the modern characterization techniques like XRD, SEM, TEM, etc. used to analyze the materials for their useful properties.				

SYLLABUS

Unit 1: Fundamentals of Materials Science & Engineering

Introduction- bonding in solids - crystal structure – crystallographic directions and planes. Defects in Crystals- Point defects- Dislocations- Burgers vectors.

Unit 2: Conducting & Dielectric Materials

Introduction- Types of conducting materials- Sources of Resistivity of Metals and Alloys- Electrical Conductivity at High Frequencies.

Dielectrics- Introduction- Polarization mechanisms in dielectris- Frequency and Temperature dependence of dielectric constant - Dielectric loss- Dielectric breakdown & strength.

Unit-3: Superconducting Materials

Introduction- General properties of superconducting state- Meissner effect- Type-I and Type-II superconductors- DC and AC Josephson effect- (Qualitative)- SQUID'S.

Unit-4: Advanced Materials

Introduction- Ferroelectric Materials- Spontaneous polarization- Piezoelectric materials Ferrites- Structure and properties- Applications- Multiferroic materials- Solar cells.

Unit-5: Nanomaterials

Introduction- Factors influencing at nanoscale- Types of nanomaterials- Preparation (Ball milling method, Physical Vapor deposition, Laser ablation method)- Properties (Physical- Optical- Electrical- Magnetic properties)- Applications of nanomaterials.

Unit-6: Modern Techniques for Material Studies

Introduction- X-Ray diffraction- Transmission Electron microscopy (TEM)- Scanning Electron microscopy (SEM)- EDAX (Energy Dispersive X-Ray Analysis)- Thermogravimetric Analysis (TGA) – Differential thermal analysis (DTA) – Electron spin resonance technique (ESR).

Text books:

1. W. D. Callister (Jr.), Material Science and Engineering - an Introduction, 6th Ed., John Wiley & Sons.

2. G. Cao, "Nanostructures and Nanomaterials: Synthesis, Properties and Applications", Imperial College Press, 2004

Reference Books:

1. Raghavan V., Material Science and Engineering Prentice Hall of India, New Delhi
2. James F. Shackelford (1996), Introduction to Materials Science for Engineers,Prentice Hall, India

S.NO.	COURSE OUTCOMES
CO 1.	Student shall understand about different crystal systems, planes and directions of planes in crystals, types of bonds in crystalline solids, defects and types of defects in crystals.
CO 2.	Student shall understand about the sources of electrical resistivity, dielectric polarization, dielectric constant, dielectric loss and breakdown strength.
CO 3.	Student shall understand about zero resistance, Meissner effect, soft and hard superconductors and applications of superconductors.
CO 4.	Student shall understand about properties and applications of ferroelectrics, piezoelectrics, ferrites and preparation, properties and applications of nanomaterials.
CO 5.	Student shall understand about modern characterization techniques useful to analyze the structural, microstructural, thermal and magnetic properties of materials.

MATERIALS SCIENCE											
Course designed by	DEPARTMENT OF PHYSICS										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	√	√		√							

A1MAT104	FOUNDATION ELECTIVE	L	T	P	C
	ENGINEERING MATHEMATICS-II	3			3
	Total Contact Hours – 48				
	Prerequisite : None				
COURSE OBJECTIVES					
COBJ1	To learn the method of expressing functions of periodic nature of an infinite series of trigonometric functions (sine and cosine) and to learn about Fourier transforms				
COBJ2.	To learn the concept of curve tracing and the method of finding lengths, volumes and surface area of revolution of varies curves.				
COBJ3.	To learn about Gradient of Scalar point function, Divergence and Curl of a vector point function and their physical significance.				
COBJ4.	To learn the method of evaluating the line, surface and volume integrals and their relations using vector integral theorems which are useful in many fields like fluid mechanics, electromagnetic field theory .				

SYLLABUS

UNIT – I: FOURIER SERIES:

Introduction-Euler's formula-conditions for Fourier expansion-functions having points of discontinuity –change of interval– expansion of even and odd periodic functions-Half-range series

UNIT – II: FOURIER TRANSFORMS:

Introduction-definition-Fourier integral theorem (statement only) – Fourier sine and cosine integrals – Fourier transforms-Fourier sine and cosine transforms – properties of Fourier transforms (without proofs) – inverse transforms – Finite Fourier sine and cosine transforms.

UNIT-III: INTEGRAL CALCULUS AND ITS APPLICATIONS:

Curve tracing (Concepts only)- Lengths of plane curves- Volumes and Surface areas of revolution .

UNIT – IV: MULTIPLE INTEGRALS:

Double Integrals – Change of order of Integration–Triple integrals- change of variables.
Application: Moment of inertia.

UNIT – V: VECTOR CALCULUS AND APPLICATIONS:

Differentiation of vectors-scalar and vector point functions-del applied to scalar point functions -Gradient-del applied to vector point functions- Divergence and Curl- del applied twice to point functions (statements)-del applied to products of point functions (statements).

UNIT – VI: INTEGRATION OF VECTORS:

Introduction-Line integral –circulation- work done – surface integrals –flux-volume integral-Green's theorem in the plane - Stoke's and Gauss's Divergence Theorems (Without proof) and related problems.

Text Book :

1.B.S.GREWAL, Higher Engineering Mathematics, 42nd Edition, Khanna publishers

Reference Books :

2. ERWIN KREYSZIG, Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. Schaum's Outline series of Integral calculus (schaum's Outline Series)

COURSE OUTCOMES:

CO1. Student will be able to solve boundary value problems using Fourierseries and Fourier transforms.
CO2. Student will be able to find the lengths ,surface area of revolutionand volume of revolution for various curves.
CO3. Student will be able to understand the physical significance of vector operators.
CO4. Student will be able to apply vector integral theorems to evaluate Line, Surface and Volume integrals with ease.

A1MAT104- ENGINEERING MATHEMATICS-II											
Course designed by	DEPARTMENT OFMATHEMATICS										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	X				X						X

A1MAT104- ENGINEERING MATHEMATICS-II	
Course designed by	DEPARTMENT OFMATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1PYT105	**FOUNDATION ELECTIVE**	**L**	**T**	**P**	**C**
	ELECTROMAGNETICS THEORY	**3**			**3**
	Total Contact Hours – 48				
	Prerequisite: Basic Engineering Mathematics **Fundamental Physics concepts**				
COURSE OBJECTIVES					
1.	Perform some elementary vector analysis				
2.	Understand the field concepts as they arise in various engineering electromagnetic problems;				
3.	Recognize the relevance of Maxwell's equations in electromagnetic field theory.				
4.	Understand the fundamental nature of static electric fields, potential, flux, charge densities, static magnetic fields, steady current, resistance, capacitance, inductance, stored energy, materials, and boundary conditions.				
5.	Understand Faraday's law of induction, electromagnetic fields, Maxwell's equations, boundary conditions				

SYLLABUS

UNIT I
INTRODUCTION
Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems-vector calculus – Gradient, Divergence and Curl - Divergence theorem – Stoke's theorem.

UNIT II
ELECTROSTATICS
Coulomb's Law – Electric field intensity – Field due to point and continuous charges – Gauss's law and application – Electric potential – Electric field and equipotential plots – Electric field in free space,

UNIT III
ELECTRIC FIELDS IN MATERIALS
Properties of materials-convection and conduction currents -conductors –polarization in dielectrics- dielectric constant and strength - continuity equation - Boundary conditions involving conductors, dielectric, and free space. Poisson and Laplace's equations-uniqueness theorem- Solution of Laplace's equation of single variable only

UNIT IV
MAGNETOSTATICS
Lorentz Law of force, magnetic field intensity – Biot–savart Law - Ampere's Law – Magnetic field due to straight conductors, circular loop, infinite sheet of current – Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization – Scalar and vector potential.

UNIT V:

MAGNETIC FORCE

Forces due to magnetic fields-magnetic torque and moment-Force and Torque on a closed circuit- Magnetic Materials- Boundary conditions at the interface of two different magnetic materials - Self and mutual inductance – determination of self inductance of a Solenoid and Toroid - Energy density in magnetic field

UNIT VI

ELECTRODYNAMIC FIELDS

Faraday's laws, induced emf – Transformer and motional EMF – Forces and Energy in quasi-stationary Electromagnetic Fields - Maxwell's equations (differential and integral forms) – Displacement current – Relation between field theory and circuit theory.

TEXT BOOKS

1. Engineering Electromagnetics –William H Hayt&Jhon A Buck, McGraw Hill Companies, 7th Edition.2006

REFERENCES BOOKS:

1. Principles of Electromagnetics – Sadiku, Oxford Publications, 4th Edition
2. Introduction to Electrodynamics – D.J Griffiths, Prentice Hall of India, 2nd Edition

Course Outcomes:

1. Identify the appropriate vector analysis concepts for a particular application. (Knowledge)
2. Differentiate between electrical field intensities due to various charge configurations. (Comprehension)
3. Identify the fundamental laws of electromagnetic theory and apply these laws in the development of the theory for power transmission lines and electrical machines.(Application).
4. Analyze the behavior of theses fields in different medias. (Analysis)
5. Design and develop various types of capacitances and inductances for all types of configurations. (Synthesis)

A1PYT105- ELECTROMAGNETICS THEORY											
Course designed by	Electrical & Electronics Engineering Department										
CO/PO mapping	a	b	c	d	e	f	g	h	i	j	k
Identify the appropriate vector analysis concepts for a particular application. (Knowledge)	H			L	H			M			L
Differentiate between electrical field intensities due to various charge configurations. (Comprehension)	H							M			L
Identify the fundamental laws of electromagnetic theory and apply these laws in the development of the theory for power transmission lines and electrical machines.(Application).	H	M			M			M			L
Analyze the behavior of theses fields in different medias. (Analysis)	H							M			L
Design and develop various types of capacitances and inductances for all types of configurations. (Synthesis)	H		M		M			M			

A1CYT106	FOUNDATION ELECTIVE	L	T	P	C
	INSTRUMENTAL METHODS OF ANALYSIS	**3**	**-**	**-**	**3**
	Total Contact Hours – 45				
COURSE OBJECTIVES					
1.	To gain the knowledge on fundamentals of spectroscopy, working principles of instrumentation and applications of UV – Visible and IR Spectroscopic techniques.				
2.	To impart the basic knowledge on fundamental concepts and theory of separation techniques.				
3.	To gain the knowledge and understand the basic difference, instrumentation involved and applications of Planar chromatography, GC and HPLC.				

SYLLABUS:

UNIT-1: INTRODUCTION TO SPECTROCHEMICAL METHODS: Laws of absorption – general principles of electro – magnetic radiation – wave properties, particle properties – Electro – Magnetic spectrum – absorption of radiation. Absorption – transmittance- atomic absorption - comparison and differences between colorimeter and spectrophotometer- Lambert's law- Beer's law- derivation of Beer's law- limitations of Beer's law

UNIT-2 : UV – VISIBLE SPECTROSCOPY: Construction- working of single beam UV-VIS spectrophotometer and double beam spectrophotometer- sources of light- monochromators (prism, grating)- detectors (photo tubes, photo multiplier tubes)- diode array spectrophotometers- applications- determination of manganese- determination of chromium

UNIT-3 : INFRA RED SPECTROSCOPY: Theory of IR absorption spectrometry – types of molecular vibrations – finger print regions – instrumentation- sampling methods for solids, liquids and gases- Applications in determination of purity, presence of water in a sample, measurement of paints and varnishes, examination of old paintings and artifacts and in industry FTIR spectroscopy.

UNIT-4: CHROMATOGRAPHIC SEPARATION METHODS: Chromatography- introduction- principles of chromatography- classification- development methods (frontal analysis, displacement development, elution development)- Van Deemter equation- Resolution- Rf value

UNIT-5: PLANAR CHROMATOGRAPHY:

1.Paper chromatography – principle - R_f value – solvent systems – development techniques – applications

2. Thin layer chromatography – principle - R_f value- types of adsorbents – solvents – development techniques – applications.

UNIT-6: COULMN CHROMATOGRAPHY

1. Gas liquid chromatography- principle- instrumentation (carrier gas, columns, sample injection systems and detectors)- application of GLC in petroleum industry
2. High performance Liquid Chromatography- advantages (theoretical plate concept)- Instrumentation (pumps, columns, detectors)- application of HPLC in pharmaceutical industry.

PRESCRIBED TEXT BOOK

1. Fundamentals of analytical chemistry, Skoog, West and Holler, Cengage Learning
2. Instrumental methods of analysis, Gurdeep R Chatwaal&Anand, Himalaya Publishing house
3. Separation Methods, M.N Sastri, Himalaya Publishing house.

STANDARD BOOKS

1. Instrumental Methods of Analysis, H. Kaur, Himalaya Publishing house
2. Instrumental methods of chemical analysis, B. K. Sharma.

REFERENCES

1. Instrumental Methods of Analysis, Willard, Merrit, Dean and Settle, CBS Publications
2. Instrumental Methods of Analysis, H. Kaur, Himalaya Publishing house
3. Chemical Separation methods, John A Dean, Van Nostrandand Reinhold.

COURSE OUTCOMES:

i. Students gain the knowledge of the fundamental principles of spectrochemical techniques; understand the basic difference between them and their applications.
ii. Students gain the knowledge and fundamental concepts of various separation techniques used across the various industries.
iii. Students gain the knowledge on basic difference, instrumentation involved and applications of planar chromatography, GC and HPLC.

A1CYT106 - INSTRUMENTAL METHODS OF ANALYSIS											
Course designed by	Department of Chemistry										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	✓							✓	✓	✓	✓

A1CYT106 - INSTRUMENTAL METHODS OF ANALYSIS	
Course designed by	Department of Chemistry
Approval	Approved by: Meeting of Board of Studies held on 23.06.15
	Ratified by: 1st Meeting of Academic Council, June, 2015

A1MET107	FOUNDATION ELECTIVE	L	T	P	C
	THERMODYNAMICS	3	0	0	3
	Total Contact Hours – 48				

COURSE OBJECTIVES	
1	To Prepare the students to apply basic conversion principles of mass and energy to open and closed systems
2	To enable the students to understand laws of thermodynamics and apply it to various systems.
3	To develop an intuitive understanding about pure substances and gas power cycles for evaluating the performance of power plants

SYLLABUS

UNIT I

Introduction: Basic Concepts : Types of systems, Surrounding, types of boundaries, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Work transfer and Heat transfer, Point and Path function.

UNIT II

Zeroth Law of Thermodynamics – Joule's Experiments – First law of Thermodynamics First law applied to a Process – First law applied to a flow system – Steady Flow Energy Equation.

UNIT III

Limitations of the First Law –Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements and their Equivalence, Carnot cycle and its specialties, Clausius Inequality, Entropy, Principle of Entropy Increase –Tds relations, Maxwell Relations Clausius – Clapeyron Equation –Third Law of Thermodynamics.

UNIT IV

Throttling and Free Expansion Processes – Flow processes –Ideal gas equation, Deviations from perfect Gas Model – Vander Waals Equation of State

Pure Substances, T-S and h-s diagrams, Phase Transformations – Triple point Dryness Fraction –Property tables. Mollier charts – Various Thermodynamic processes and energy Transfer

UNIT V

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes, Enthalpy, sp. Heats and Entropy of Mixture of perfect Gases, Psychrometry- properties , chart.

UNIT VI

Thermodynamic Cycles: Otto, Diesel, Dual, Sterling,– Description and representation on P–V and T-S diagram, Thermal efficiency, Mean effective pressures on air standard basis – Comparison of Cycles – Bell Coleman cycle, Vapour compression refrigeration cycle. Thermodynamic analysis

TEXT BOOKS:

1. Engineering Thermodynamics, P.K. Nag, Tata Mcgraw Hill Education Private Limited
2. Fundamentals of Thermodynamics – Richard E. Sonntag, Claus Borgnakke and Gordon J. Van Wylen, John Wiley & Sons (ASIA).

REFERENCE BOOKS:

1. Engineering Thermodynamics – J.B. Jones & R.E. Dugan, Prentice Hall- Gale
2. Thermodynamics: An Engineering Approach – Yunus A. Cengel&Michael A. Boles, McGraw Hill College.
3. Thermodynamics – J.P. Holman , McGraw Hill Inc

COURSE OUTCOMES:

Student will be able to

i. Identify open and closed systems and analyze related problems.
ii. Explain the concepts such as work interaction, heat transfer and laws of thermodynamics.
iii. Demonstrate the importance of P-V, T-S and H-S diagrams.
iv. Analyze the performance of gas power cycles

A1MET107 THERMODYNAMICS												
Course designed by	Department of Mechanical Engineering											
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k	l

A1MET107 THERMODYNAMICS	
Course designed by	Department of Mechanical Engineering
Approval	Approved by: Meeting of Board of Studies held on 17th June, 2015
	Ratified by: 1st Meeting of Academic Council, 27th June, 2015

A1CYT108	FOUNDATION ELECTIVE	L	T	P	C
	APPLIED ANALYSIS	3	-	-	3
	Total Contact Hours – 45				

COURSE OBJECTIVES	
1.	A broad understanding and the comprehensive overview of the general principles of Metallurgy and the importance of constituents and analysis of Iron ores, ferrous alloys
2.	To understand the composition, importance and analysis of finished products like cement, paint, oils, soaps.
3.	To understand the composition of water and analysis of water for some parameters.
4.	To provide the knowledge on basic principles of analysis of food and pharmaceutical drug samples.

SYLLABUS:

UNIT-1: ANALYSIS OF ORES:

a. General techniques of analysis applied to complex materials - Scope of metallurgical analysis - General methods of dissolution of complex materials - Various chemical methods for the effective separation of the constituents in the complex materials.

b. Analysis of ores: Iron ore- Analysis of the Constituents – Moisture , loss of ignition, Total Iron, ferrous Iron ,Ferric Iron, alumina , silica, Titania, Lime, Magnesia, Sulphur, phosphrous, manganese, alkalis, combined water.

UNIT-2 : ANALYSIS OF FERROUS ALLOYS

a. Ferro manganese - Analysis of the constituents – Mn, S, C, P, Si

b. Ferro chromium - Analysis of the constituents – Cr, C, Si.

UNIT-3: ANALYSIS OF FINISHED PRODUCTS - I:

a. Chemical Analysis of cement-silica, NH_4OH group, ferric oxide, alumina, lime, magnesia, SulphideSulphur , K_2O,Na_2O, free CaO in Cement and Clinker,SO_3 and loss on ignition.

b. Analysis of paints-vehicle and pigment, $BaSO_4$, total lead and lead chromate.

UNIT-4: ANALYSIS OF FINISHED PRODUCTS - II:

a. Analysis of oils - saponification number, iodine number, and acid number.

b. Analysis of soaps - moisture, volatile matter, total alkali, total fatty matter, free caustic alkali or free fatty acids, sodium silicate, chloride.

UNIT-5: ANALYSIS OF WATER: Analysis of water for total hardness of water, calcium, magnesium, chloride, nitrite and fluoride

UNIT-6: ANALYSIS OF FOOD AND DRUGS

a. Analysis of Sugars, Fruits, Vegetables and Beverages

b. Analysis of anti-pyretic, analgesics and antibiotics.

PRESCRIBED TEXT BOOK

1. Text book of Metallurgical analysis, B.C. Aggrawal, S.P. Jain, Khanna Publishers
2. Technical methods of analysis, Griffin
3. Pharmaceutical analysis, T. Higuchi
4. Environmental chemistry, A. K. De, Wiley Eastern

STANDARD BOOKS

1. Chemical analysis – H.A Laitinan, McGraw Hill Book Co
2. Standard methods of Chemical Analysis, Welcher,
3. Analytical chemistry, R. M. Verma, CBS Publications.

REFERENCES

1. Practical pharmaceutical chemistry Vol – I & II, A. Beckett et.al., CBS publishers
2. Vogel's Text book of Quantitative chemical analysis, J Mendham, et. Al., Pearson Education.

COURSE OUTCOMES:

i. Students gain the knowledge about the various methods that are available for general metallurgical analysis and the analysis of iron ore and ferrous alloys.

ii. Students gain the knowledge of the constituents present, their importance and analysis of their constituents present in the finished products like cement, paints, oils, soaps.

iii. Students gain the knowledge on the composition of water, importance of their constituents and analysis of some of the parameters in water sample.

iv. Students gain the knowledge on the analysis of food samples like sugars, fruits, vegetables and beverages. He will also have comprehensive knowledge on analysis of some pharmaceutical drugs like analgesics, anti – pyretic and anti-biotics.

A1CYT108- APPLIED ANALYSIS											
Course designed by	Department of Chemistry										
CO / PO mapping	a	b	c	d	e	f	g	h	i	j	k
	✓							✓	✓	✓	✓

A1CYT108- APPLIED ANALYSIS	
Course designed by	Department of Chemistry
Approval	Approved by:
	Ratified by:

A1MAT109	FOUNDATION ELECTIVE	L	T	P	C
	PROBABILITY AND STATISTICS	3			3
	Total Contact Hours – 45				
	Prerequisite: Set theory and Calculus				

COURSE OBJECTIVES	
COBJ1	To provide basic knowledge to the students with an understanding of probability principles, techniques, and practices relevant to the applications and the random Variables and Distributions.
COBJ2.	Students will be able to model situations using Statistical methods in order to solve problems.
COBJ3.	To develop knowledge and skills related to investigate situations involving elements of chance by sampling, estimating the parameters and testing.
COBJ4.	To provide knowledge to the students about Prediction and control by statistical methods Regression and SQC.

SYLLABUS

UNIT – 1 : PROBABILITY&RANDOM VARIABLES

Random experiment, sample space, events, Axioms of probability, Random variable, Discrete and Continuous, Distribution, mathematical expectation and properties, Moment generating Function.

UNIT – 2: DISTRIBUTIONS

Binomial - Poisson distribution(mean and variance), Normal distribution, Normal approximation to Binomial distribution, Gamma distribution - properties.

UNIT – 3: CURVE FITTING

Least squares method: Introduction, fitting of straight line, second degree curves, exponential and power curves, simple correlation, regression, applications.

UNIT – 4: SAMPLING THEORY

Introduction, Population and samples, Sampling distribution of mean for large and small samples (with known and unknown variance), proportion - Sampling distribution of sums and differences of means and proportions, Point and interval estimators for means and proportions.

UNIT – 5: TESTS OF HYPOTHESIS

Introduction, Null and alternative hypothesis, Type I and Type II errors, One tail, two-tail tests. Tests concerning means, proportions and their differences using Z-test, Student's t-test, F-test and χ^2 - test of goodness of fit and independence of attributes.

UNIT – 6: STATISTICAL QUALITY CONTROL

Introduction, Methods for preparing control charts, variable charts – mean and range charts, Attribute charts- np, p and c charts.

Text Books

1. Probability & statistics for Engineers and Scientists ; R.E.Walpole, S. L. Mayeres&K.YePearsons
2. Probability and statistics-TKV Iyengar et al.,S.Chand publishers

References:

1. Probability & statistics and Random Processes ; Murugesan -Anuradha Publishers
2. Probability & Statistics for Engineers, Miller& John E. Freund, Prentice Hall of India.
3. Statistical Quality Control – Mahajan . M – danaparthiRai& co.
4. Higher Engineering Mathematics by B.S.Grewal, 42nd edition, Khanna Publishers

COURSE OUTCOMES:

CO1	Students will able to apply probabilistic tools to study systems with random components in many areas of communication networks, electro physics and computers.
CO2	Students will be able to estimate the parameters of population in many socio- economic and industrial production related surveys and reducing sampling errors.
CO3	Students will able to get Prediction and control the numerical and time series data occurs in industry and scheduling
CO4	Student will able to evaluate the performance measures of the systems in Networks, transportation systems, process and production lines.

COURSE OBJECTIVES/ COURSE OUTCOMES MAPPING

Objectives/Outcomes	CO1	CO2	CO3	CO4
COBJ1	X			
COBJ2		X		
COBJ3			X	
COBJ4				X

A1MAT109 PROBABILITY AND STATISTICS											
Course designed by	DEPARTMENT OF MATHEMATICS										
CO / PO mapping	a	B	C	D	e	f	g	h	i	j	k
	X				X						X

A1MAT109 PROBABILITY AND STATISTICS

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies.
	Ratified by: 2nd Meeting of Academic Council.

A1MAT110	FOUNDATION ELECTIVE	L	T	P	C
	Complex Variables &Statistical Methods	**3**			**3**
	Total Contact Hours – 45				
	Prerequisite : None				

COURSE OBJECTIVES	
COBJ1	To understand the concept of analyticity of complex functions
COBJ2.	To learn the method of integration of complex functions in the given region by Cauchy's integral formula and by residue theorem
COBJ3.	To learn the probability distributions of discrete and continuous random variables.
COBJ4.	To learn the methods of sampling, estimation of parameters, testing of hypothesis.

SYLLABUS

UNIT – I: Functions of Complex Variable:
Introduction – Limit and continuity of complex function f(z)-Derivative of f(z)- Cauchy & Riemann equations-Analytic functions- Harmonic functions –Construction of analytic function by Milne -Thomson method.

UNIT – II: Power Series:
Series of complex functions –Expansion of complex functions using Taylor's and Laurent's series – Zeros of analytic function- types of Singularities.

UNIT-III: Complex Integration:
Complex Integration – Line Integral – Cauchy Integral theorem- Cauchy Integral formula – Residues- Calculation of Residues- Evaluation of complex integrals using Cauchy's Residue theorem .

UNIT – IV:Statistical Distributions.
Random variables - Discrete probability distribution- Continuous probability distribution- Expectation – Normal distribution-Approximation to Binomial and Poisson distribution.

UNIT-V: Sampling Distribution
Sampling distribution-Sampling distribution of mean (known- unknown cases)- Sampling distribution of sums and differences of means and proportions-Estimation - Point estimation- Interval estimation- Bayesian estimation.

UNIT-VI: Testing of Hypothesis
Testing of hypothesis, type I and type II errors - Significance test –One tail test- Two tail test concerning one mean and two means(t- test and z- test)- χ^2 test-goodness of fit.

Text Books :

1. Higher Engineering Mathematics, B.S.Grewal , 42n^{d} Edition, Khanna publishers.
2. Engineering Mathematics, B.V.Ramana, Tata McGraw hill
3. Complex Variables and Statistical Methods, T.K.V.Iyengar et al., Schand.

COURSE OUTCOMES:

CO1	Student will be able to construct the conjugate harmonic functions and Orthogonal Trajectories.
CO2	Student will be able to evaluate integrals of complex functions in the given region
CO3	Student will be able to estimate the population parameters using sample data.
CO4	Student will be able to test the hypothesis for large samples and small samples.

COURSE OBJECTIVES/ COURSE OUTCOMES MAPPING

Objectives/Outcomes	CO1	CO2	CO3	CO4
COBJ1	X			
COBJ2		X		
COBJ3			X	
COBJ4				X

A1MAT110 – COMPLEX VARIABLES & STATISTICAL METHODS											
Course designed by	DEPARTMENT OF MATHEMATICS										
CO / PO mapping	a	B	C	d	e	f	G	H	i	j	k
	X				X						X

A1MAT110 – COMPLEX VARIABLES & STATISTICAL METHODS

Course designed by	DEPARTMENT OF MATHEMATICS
Approval	Approved by: Meeting of Board of Studies held on
	Ratified by: 2nd Meeting of Academic Council,

AUDIT COURSES

A1ACA507	AUDIT COURSE	L	T	P	C
	ENTREPRENEURSHIP DEVELOPMENT				
	Total Contact Hours – 30				
COURSE OBJECTIVES					
COBJ1	To inspire the students confident of entrepreneurial process and career development with their strengths of technical knowledge and skills.				
COBJ2.	To enable the students to understand the possible challenges in entrepreneurial career and how to overcome them.				
COBJ3.	To enable the students to learn about project formulation, appraisal. Financial and implementation issues.				

UNIT – 1: Introduction: Evolution of entrepreneurship, Characteristics, Types and Functions of Entrepreneur; Role of Entrepreneurship in Economic Development, Growth of Entrepreneurship in India; Women entrepreneurship.

UNIT – 2: Entrepreneurial Motivation and Promotion: Entrepreneurial behavior and qualities, Motivational programmes, Achievement motivation theories. Entrepreneurial promotion, Difference between entrepreneur and Manager.

UNIT – 3: Small Scale Industry: Introduction: Small and Medium enterprises–Definition, characteristics and their role in economic development, Growth of small-scale sector in India, Problems of small–scale industries, Micro, Small and Medium Enterprises Development Act **(MSMEDA) 2006**: Objectives and main provisions.

UNIT – 4: Starting the venture: Generating business idea – sources of new ideas, methods of generating ideas, opportunity recognition, creative problem solving; environmental scanning, competitor and industry analysis; Feasibility study and preparing DPR.

UNIT – 5: Government and Institutional support: Government support to SSI through priority sector,NSIC- National small industries corporation, DIC – District Industrial Center, SISI – Small Industries Services Institute, NIESBUD – National Institute of Entrepreneurship and Small Business Development, SIDBI – Small industries development bank of India, NEDB – National Entrepreneurship Development Board, EDII – Entrepreneurship Development Institute of India.

Reference books:

1. C.B. Gupta and S.S. Khanka, Entrepreneurship and Small Business Management, Sultan Chand and Sons, New Delhi.
2. M.B. Shukla, Entrepreneurship and Small Business Management, Kitab Mahal, Allahabad.
3. A. Sahay and V. Sharma, Entrepreneurship and New Venture Creation, Excel Books, New Delhi.
4. V. Desai, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House.
5. V. Desai, Small Scale Industries and Entrepreneurship, Himalaya Publishing House.

COURSE OUTCOMES:

CO1 Demonstrate the ability to provide a self-analysis in the context of an Entrepreneurial Career.
CO2 Demonstrate the ability to find an attractive market that can be reached Economically.
CO3 It helps the students in creating an Appropriate Business-Model for their innovations.

Course outcomes	CO/GA Mapping - Graduate Attributes											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	√					√	√					√
2						√	√					
3			√	√	√							

A1ACA509	AUDIT COURSE	L	T	P	C
	Professional Ethics & IPR				
	Total Contact Hours – 30				

Unit I : Human Values :

Moral, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage – Value time - Co-operation – Commitment – Empathy – Self -confidence – Spirituality – Character .

Unit II : Engineering Ethics :

The History of Ethics- Purposes for Engineering Ethics – Engineering Ethics – Consensus and Controversy – Professional and Professionalism – Professional Roles to be played by an Engineer – Self Interest , Customs and Religion – Uses of Ethical Theories – Professional Ethics Types of Inquiry – Engineering and Ethics-Kohlberg's Theory Gilligan's Argument – Heinz's Dilemma.

Unit III

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual property Rights – Agencies Responsible for Intellectual Property Registration – Infringement -Regulatory – Over use or Misuse of Intellectual Property Rights .

Unit IV

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership –Transfer and Duration –Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

Unit V

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation –International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law.

TEXT BOOKS

1. "Engineering Ethics and Human Values" by M.Govindarajan, S.Natarajan and V.S Senthilkumar-PHI Learning Pvt.Ltd-2009
2. Deborah E.Bouchox: "Intellectual Property" Cengage learning, New Delhi

REFERENCE BOOKS :

1. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumar –Laxmi Publications.
2. "Ethics in Engineering"by Mike W.Martin and Roland Schinzinger – Tata Mc Graw-Hill – 2003
3. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers" BS Publications (Press)

A1ACA510	AUDIT COURSE	L	T	P	C
	SOFT SKILLS – I	1	0	2	0
	Total Contact Hours – 30				
	Prerequisite: NIL				

COURSE OBJECTIVES	
COBJ1	To develop inter-personal skills and be an effective goal oriented team player.
COBJ2	To develop professionals with idealistic, practical and moral values.
COBJ3	To develop communication and problem solving skills.
COBJ4	To re-engineer attitude and understand its influence on behavior.

Unit -1 **4 hrs**

- **SELF ANALYSIS**
  - SWOT/SWOC Analysis
  - Who am I? An Introspection
  - Attributes
  - Important of Self Confidence
  - Self Esteem

Unit -2 **4 hrs**

- **ATTITUDE**
  - Factors influencing Attitude
  - Challenges and lessons from Attitude
- **CHANGE MANAGEMENT**
  - Exploring Challenges
  - Risking Comfort Zone
  - Managing Change

Unit -3 **6 hrs**

- **MOTIVATION**
  - Factors of motivation
  - Self-talk
  - Intrinsic & Extrinsic Motivators

Unit -4 **6 hrs**

- GOAL SETTING
  - Wish List
  - SMART Goals
  - Blue print for success
  - Short Term
  - Long Term
  - Life Time Goals
- **Time management**
  - Value of time
  - Diagnosing Time Management
  - Weekly Planner -to do list
  - Prioritizing work

Unit -5 **10 hrs**

- **CREATIVITY**
  - Out of box thinking

ASSESSMENT

1. A Practical and activity oriented course which has continuous assessment for 75 marks based on class room interaction, activities etc.
2. Presentation – 25 marks.

TEXT BOOKS: Institute's Compilation

REFERENCE BOOKS

1	Covey Sean, "*Seven Habits of Highly Effective Teens*," New York, Fireside Publishers, 1998.
2	Carnegie Dale, "*How to win Friends and Influence People*," New York: Simon & Schuster, 1998.
3	Thomas A Harris, "*I am ok, you are ok*", New York-Harper and Row, 1972.
4	Daniel Coleman, "*Emotional Intelligence*", Bantam Book, 2006.

Course Outcomes:

CO1	Students shall develop their interpersonal skills and shall be an effective goal oriented team player
CO2	Students shall evolve as professional with idealistic, practical and moral values
CO3	Students shall develop communication and problem solving skills
CO4	Students develop improve their attitude towards life and understand its influence on their behavior.

Mapping of Course Objectives & Outcomes:

- Matrix with each outcome as one column and each objective as one row.

Outcome/ Objective	CO1	CO2	CO3	CO4	CO5	CO6
COBJ1						
COBJ2						
COBJ3						
COBJ4						

A1ACA510 – SOFT SKILLS -I											
Course designed by	English and Humanities										
CO / PO mapping (SIZE:12)	a	b	c	d	e	f	G	h	i	j	k

A1ACA510 – SOFT SKILLS -I

Course designed by	English and Humanities
Approval	Approved by: Meeting of Board of Studies held on 6th April,2016

A1ACA511	AUDIT COURSE	L	T	P	C
	SOFT SKILLS – II	1	0	2	0
	Total Contact Hours – 30				
	Prerequisite: NIL				

COURSE OBJECTIVES	
COBJ1	To develop inter personal skills and be an effective goal oriented team player.
COBJ2	To develop professionals with idealistic, practical and moral values.
COBJ3	To develop communication and problem solving skills.
COBJ4	To re-engineer attitude and understand its influence on behavior.

Unit -1 **6 hrs**

- **INTERPERSONAL SKILLS**
  - Understanding the relationship between Leadership Networking & Team work
  - Realizing Ones Skills in Leadership
  - Networking & Team Work
  - Assessing Interpersonal Skills Situation description of Interpersonal
- **Team work**
  - Necessity of Team Work Personally
  - Socially and Educationally

Unit -2 **4 hrs**

- **LEADERSHIP**
  - Skills for a good Leader
  - Assessment of Leadership Skills

Unit -3 **6 hrs**

- **STRESS MANAGEMENT**
  - Causes of Stress and its impact
  - How to manage & distress
  - Understanding the circle of control
  - Stress Busters

Emotional Intelligence

- What is Emotional Intelligence
- Emotional quotient why Emotional Intelligence matters
- Emotion Scales
- Managing Emotions

Unit -4 **4 hrs**

- **CONFLICT RESOLUTION**
  - Conflicts in Human Relations – Reasons Case Studies
  - Approaches to conflict resolution

Unit -5 **10 hrs**

Decision Making

- Importance and necessity of Decision Making
- Process of Decision Making
- Practical way of Decision Making
- Weighting positives & Negatives.

- **Presentation**

ASSESSMENT

1. A Practical and activity oriented course which has continuous assessment for 75 marks based on class room interaction, activities etc.
2. Presentation – 25 marks.

TEXT BOOKS: Institute's Compilation

REFERENCE BOOKS

1	Covey Goodman, "*Seven Habits of Highly Effective Teens*," New York, Fireside Publishers, 1998.
2	Carnegie Dale, "*How to win Friends and Influence People*," New York: Simon & Schuster, 1998.
3	Thomas A Harris, "*I am ok, you are ok*", New York-Harper and Row, 1972.
4	Daniel Coleman, "*Emotional Intelligence*", Bantam Book, 2006.

Course Outcomes:

CO1	Students shall develop their interpersonal skills and shall be an effective goal oriented team player
CO2	Students shall evolve as professional with idealistic, practical and moral values
CO3	Students shall develop communication and problem solving skills
CO4	Students develop improve their attitude towards life and understand its influence on their behavior.

Mapping of Course Objectives & Outcomes:

- Matrix with each outcome as one column and each objective as one row.

Outcome/ Objective	CO1	CO2	CO3	CO4	CO5	CO6
COBJ1						
COBJ2						
COBJ3						
COBJ4						

A1ACA511 – SOFT SKILLS -II											
Course designed by	English and Humanities										
CO / PO mapping	a	b	c	d	e	f	G	h	i	j	k

A1ACA511 – SOFT SKILLS -II

Course designed by	English and Humanities
Approval	Approved by: Meeting of Board of Studies held on 06th April, 2016

A1ACA512	AUDIT COURSE	L	T	P	C
	GENERAL APTITUDE	2	0	0	0
	Total Contact Hours – 32				
	Prerequisite : None				
COURSE OBJECTIVES					
COBJ1	To improve the quantitative aptitude skills				
COBJ2.	To improve the logical thinking				

SYLLABUS

UNIT I

Averages,
Ratios: Compound ratio, Inverse ratio
Proportion: Compound Proportion, Proportional division
Mixtures & Solutions

UNIT II

Percentages, profit & Loss, Simple Interest & Compound Interest

UNIT III

Time & Work, Time & Distance

UNIT IV

Types and Properties of Numbers, LCM, GCD, Partnership, Clocks & Calendars

UNIT V

Mensuration, -I (Area and perimeter of plane figures)
Mensuration-II (Volume and surface areas of solids)

UNIT VI

Permutations, Combinations, Probability

REFERENCES

1. Quicker Maths by M.Tyra
2. Agarwal.R.S – Quantitative Aptitude for Competitive Examinations, S Chand Limited 2011
3. AbhijitGuha, Quantitative Aptitude for Competitive Examinations, Tata Mcgraw Hill, 3rd Edition

COURSE OUTCOMES:CO1Students will be able to improve their employability skills

COURSE OBJECTIVES/ COURSE OUTCOMES MAPPING

Objectives/Outcomes	CO1
COBJ1	X
COBJ2	X

A1ACA512 - GENERAL APTITUDE											
Course designed by	DEPARTMENT OFMATHEMATICS										
CO / PO mapping	A	b	c	d	e	f	g	h	I	j	k
	X			X							

A1ACA512 - GENERAL APTITUDE

Course designed by	DEPARTMENT OF MATHEMATICS