

**REGULATIONS, CURRICULUM AND SYLLABUS**

**for**

**B. TECH**

**CIVIL ENGINEERING**

**(w.e.f. 2013-2014)**

**PONDICHERRY UNIVERSITY**

**PONDICHERRY - 605014**

**PONDICHERRY UNIVERSITY**  
**BACHELOR OF TECHNOLOGY PROGRAMMES**  
**(EIGHT SEMESTERS)**  
**REGULATIONS**

**1. Conditions for Admission:**

- a) **Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed :**

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (40% marks for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

- b) **For Lateral entry in to third semester of the eight semester B.Tech programme :**

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology from an AICTE approved institution with at least 45% marks (40% marks for OBC and SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in B.Sc. degree from a recognized university as defined by UGC with at least 45% marks ( 40% marks for OBC and SC/ST candidates) and passed XII standard with mathematics as a subject.

Provided that in case of students belonging to B.Sc Stream shall clear the subjects of Engineering Graphics and Engineering Mechanics of the first year Engineering program along with the second year subjects.

Provided further that, the students belonging to B.Sc Stream shall be considered only after filling the supernumerary seats in this category with students belonging to the Diploma stream.

The list of diploma programs approved for admission for each of the degree programs is given in **Annexure A.**

**2. Age Limit :**

The candidate should not have completed 21 years of age as on 1<sup>st</sup> July of the academic year under consideration. For Lateral Entry admission to second year of degree programme , there is no age limit. For SC/ST candidates, the age limit is relaxable by 3 years.

**3. Duration of Programme :**

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.

**4. Eligibility for the award of Degree:**

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

**5. Branches of Study:**

Branch I	- Civil Engineering
Branch II	- Mechanical Engineering
Branch III	- Electronics & Communication Engineering
Branch IV	- Computer Science & Engineering
Branch V	- Electrical & Electronics Engineering
Branch VI	- Chemical Engineering
Branch VII	- Electronics & Instrumentation Engineering
Branch VIII	- Information Technology
Branch IX	- Instrumentation & Control Engineering
Branch X	- Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

## 6. Subjects of Study:

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

## 7. Examinations:

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

- (a) Theory courses for which there is a written paper of 75 marks in the university examination.

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

- 5 marks for 95% and above
- 4 marks for 90% and above but below 95%
- 3 marks for 85% and above but below 90%
- 2 marks for 80% and above but below 85%
- 1 mark for 75% and above but below 80%

In total, three tests are to be conducted and the better two are to be considered for assessment.

- (b) Practical courses for which there is a university practical examination of 50 marks:

The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.

- 10 marks for 95% and above
- 8 marks for 90% and above but below 95%
- 6 marks for 85% and above but below 90%
- 4 marks for 80% and above but below 85%
- 2 marks for 75% and above but below 80%

## 8. Requirement for appearing for University Examination:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

- i) He / She secures not less than 75% overall attendance arrived at by taking into account the total

number of periods in all subjects put together offered by the institution for the semester under consideration.

*(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director)*

- ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester
- iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

#### **9. Procedure for completing the course:**

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

#### **10. Passing Minimum:**

- a. A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination
- b. A candidate who has been declared “Failed” in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.
  - i. Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.
  - ii. The candidate should have attended all the college examinations as well as university examinations.
  - iii. If a candidate has failed in more than four papers in the current university examination, his/her representation for revaluation will not be considered.
  - iv. The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts

#### **11. Award of Letter Grades**

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

Range of Total Marks	Letter Grade	Grade Points
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5

0 to 49	F	0
Incomplete	FA	

‘F’ denotes failure in the course. ‘FA’ denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

- The college in which the candidate has studied.
- The list of courses enrolled during the semester and the grades scored.
- The Grade Point Average (GPA) for the semester and Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.
- GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

$$GPA = (SUM\ OF\ (C \times GP) / SUM\ OF\ C)$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

The conversion of CGPA into percentage marks is as given below

$$\% \text{ Marks} = (CGPA - 0.5) \times 10$$

## 12. Award of Class and Rank:

- A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.
- A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters ( 3 academic years ) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS** with **DISTINCTION**.
- A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in **FIRST CLASS**.
- All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.
- For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1<sup>st</sup> to 8<sup>th</sup> semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1<sup>st</sup> to 8<sup>th</sup> semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

## 13. Provision for withdrawal:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded **DISTINCTION** whereas they are not eligible to be awarded a rank.

## 14. Discontinuation of Course:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through

the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

**15. Revision of Regulations and Curriculum:**

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.

## ANNEXURE – A

B.Tech courses in which admission is sought	Diploma courses eligible for admission
<b>Civil Engineering</b>	Civil Engineering Civil and Rural Engineering Architectural Assistantship Architecture Agricultural Engineering
<b>Mechanical Engineering</b>	Mechanical Engineering Automobile Engineering Agricultural Engineering Mechanical and Rural Engineering Refrigeration and Air-conditioning Agricultural Engineering & Farm Equipment Technology Metallurgy Production Engineering Machine Design & Drafting Machine tool maintenance and Repairs Printing Technology / Engineering Textile Engineering / Technology Tool Engineering
<b>Electrical and Electronics Engineering</b> <b>Electronics &amp; Communication Engineering</b> <b>Electronic and Instrumentation Engineering</b> <b>Instrumentation and Control Engineering</b> <b>Bio Medical Engineering</b>	Electrical Engineering Electrical and Electronics Engineering Electronics and Instrumentation Engineering Instrumentation Engineering / Technology Electronics and Communication Engg. Electronics Engineering Medical Electronics Instrumentation and Control Engineering Applied Electronics
<b>Chemical Engineering</b>	Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology Plastic Engineering Paper & Pulp Technology / Polymer Technology
<b>Information Technology</b> <b>Computer Science &amp; Engineering</b>	Computer Science and Engineering Computer Technology Electrical and Electronics Engineering Electronics & Communication Engineering Electronics & Instrumentation Engineering Instrumentation Engineering / Technology

# CURRICULUM

## B.Tech. – CIVIL ENGINEERING

### I SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
T 101	Mathematics – I	3	1	-	4	25	75	100
T 102	Physics	4	-	-	4	25	75	100
T 103	Chemistry	4	-	-	4	25	75	100
T 104	Basic Electrical and Electronics Engineering	3	1	-	4	25	75	100
T 105	Engineering Thermodynamics	3	1	-	4	25	75	100
T 106	Computer Programming	3	1	-	4	25	75	100
	<b>Practical</b>							
P 101	Computer Programming Lab	-	-	3	2	50	50	100
P 102	Engineering Graphics	2	-	3	2	50	50	100
P 103	Basic Electrical & Electronics Lab	-	-	3	2	50	50	100
	Total	22	4	9	30	300	600	900

### II SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
T 107	Mathematics – II	3	1	-	4	25	75	100
T 108	Material Science	4	-	-	4	25	75	100
T 109	Environmental Science	4	-	-	4	25	75	100
T 110	Basic Civil and Mechanical Engineering	4	-	-	4	25	75	100
T 111	Engineering Mechanics	3	1	-	4	25	75	100
T 112	Communicative English	4	-	-	4	25	75	100
	<b>Practical</b>							
P 104	Physics lab	-	-	3	2	50	50	100
P 105	Chemistry lab	2	-	3	2	50	50	100
P 106	Workshop Practice	-	-	3	2	50	50	100
P 107	NSS / NCC *	-	-	-	-	-	-	-
	Total	22	2	9	30	300	600	900

*\* To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.*



### III Semester

Subject Code	Name of the subject	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
MA T31	Mathematics III	3	1	-	4	25	75	100
CE T32	Geo Science Engineering	4	-	-	4	25	75	100
CE T33	Building Technology	4	-	-	4	25	75	100
CE T34	Mechanics of Solids-I	3	1	-	4	25	75	100
CE T35	Mechanics of Fluids	3	1	-	4	25	75	100
CE T36	Surveying-I	3	1	-	4	25	75	100
	<b>Practical</b>							
CE P31	Surveying Lab – I	-	-	3	2	50	50	100
CE P32	Material Testing Lab - I	-	-	3	2	50	50	100
CE P33	Building planning and drawing	2	-	3	2	50	50	100
	Total	22	4	9	30	300	600	900

### IV Semester

Subject Code	Name of the subject	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
MA T41	Mathematics - IV	3	1	-	4	25	75	100
CE T42	Concrete Technology	4	-	-	4	25	75	100
CE T43	Environmental Engineering - I	4	-	-	4	25	75	100
CE T44	Mechanics of Solids - II	3	1	-	4	25	75	100
CE T45	Hydraulic and Hydraulic Machinery	3	1	-	4	25	75	100
CE T46	Surveying - II	3	1	-	4	25	75	100
	<b>Practical</b>							
CE P41	Surveying Lab II	-	-	3	2	50	50	100
CE P42	Fluid Mechanics & Machines Lab	-	-	3	2	50	50	100
CE P43	Geo Science Engineering Lab	-	-	3	2	50	50	100
SP P44	Physical Education*	-	-	-	-	-	-	-
	Total	20	4	9	30	300	600	900

*\* Under Pass / Fail option only and not counted for CGPA calculation.*

## V- Semester

Subject Code	Name of the subject	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
CE T51	Design of RCC structures	3	1	-	4	25	75	100
CE T52	Structural Analysis - I	3	1	-	4	25	75	100
CE T53	Geotechnical Engineering – I	3	1	-	4	25	75	100
CE T54	Environmental Engineering – II	4	-	-	4	25	75	100
CE T55	Transportation Engineering - I	3	1	-	4	25	75	100
	<b>Practical</b>							
CE P51	Geotechnical Engineering Lab	-	-	3	2	50	50	100
CE P52	Environmental Engineering Lab	-	-	3	2	50	50	100
CE P53	Material Testing Lab - II	-	-	3	2	50	50	100
HS P54	General proficiency – I	-	-	3	2	100	-	100
	Total	16	4	12	28	375	525	900

## VI Semester

Subject Code	Name of the subject	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
CE T61	Structural Analysis – II	3	1	-	4	25	75	100
CE T62	Geotechnical Engineering – II	3	1	-	4	25	75	100
CE T63	Transportation Engineering - II	3	1	-	4	25	75	100
CE TE1	Elective I	4	0	-	4	25	75	100
CE TE2	Elective II	4	0		4	25	75	100
	<b>Practical</b>							
CE P61	Transportation Engineering Lab	-	-	3	2	50	50	100
CE P62	Estimation Costing and Valuation Engineering Lab	2	-	3	2	50	50	100
CE P63	Computer Aided Design Lab	-	-	3	2	50	50	100
HS P64	General proficiency - II	-	-	3	2	100	-	100
CE SE1	Surveying Camp *	-	-	3	2	100	-	100
	Total	19	3	15	30	475	525	1000

\* The Survey camp will be conducted at end of V semester.

### VII Semester

Subject Code	Name of the subject	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
CE T71	Design of steel structures	3	1	-	4	25	75	100
CE T72	Hydrology and Water Resources Engineering	3	1	-	4	25	75	100
CE TE3	Elective III	4	0	-	4	25	75	100
CE TE4	Elective IV	4	0	-	4	25	75	100
	<b>Practical</b>							
CE P71	Design and Drawing (RCC & steel)	2	-	3	2	50	50	100
CE CV7	Comprehensive viva	-	-	3	2	50	50	100
CE PW7	Project Phase - I	-	-	6	6	50	50	100
	<b>Total</b>	16	2	12	26	250	450	700

### VIII Semester

Subject Code	Name of the subject	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	<b>Theory</b>							
CE T 81	Construction management	4	-	-	4	25	75	100
CE TE5	Elective-V	4	0	-	4	25	75	100
CE TE6	Elective-VI	4	0	-	4	25	75	100
	<b>Practical</b>							
CE P81	Professional Ethical Practice	3	-	-	2	100	-	100
CE W8	Industrial Training/Internship	-	-	3	2	100	-	100
CE PW8	Project Phase - II	-	-	9	8	50	50	100
	<b>Total</b>	15	0	12	24	325	275	600

## LIST OF ELECTIVES

<b>CODE</b>	<b>TITLE</b>
CEE01	DESIGN OF PRESTRESSED CONCRETE STRUCTURES
CEE02	COASTAL AND OFFSHORE STRUCTURES
CEE03	INDUSTRIAL WASTE DISPOSAL AND TREATMENT
CEE04	SAFETY PRACTICES IN CONSTRUCTION
CEE05	CONSTRUCTION METHODS AND EQUIPMENTS
CEE06	GEOTECHNICAL PROCESSES AND APPLICATIONS
CEE07	REMOTE SENSING AND GIS
CEE08	FINITE ELEMENT ANALYSIS
CEE09	ADVANCED DESIGN OF RCC STRUCTURES
CEE10	SITE INVESTIGATION METHODS AND PRACTICES
CEE11	COASTAL ENGINEERING
CEE12	TRAFFIC ENGINEERING AND MANAGEMENT
CEE13	HIGHWAY AND AIRPORT PAVEMENT DESIGN
CEE14	ADVANCED STRUCTURAL ANALYSIS
CEE15	GROUND WATER HYDROLOGY
CEE16	MACHINE FOUNDATIONS
CEE17	EARTH RETAINING STRUCTURES
CEE18	UNDERGROUND STRUCTURES
CEE19	AIR AND NOISE POLLUTION
CEE20	FAILURE ASSESSMENT AND REHABILITATION STRUCTURES
CEE21	BRIDGE ENGINEERING
CEE22	ADVANCED DESIGN OF STEEL STRUCTURES
CEE23	ENVIRONMENTAL IMPACT ASSESSMENT
HSE24	ENGINEERING ECONOMICS
CEE25	DESIGN AND CONSTRUCTION OF PREFABRICATED STRUCTURES
CEE26	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
CEE27	DESIGN OF INDUSTRIAL STRUCTURES
CEE28	FORMWORK FOR CONCRETE STRUCTURES
CEE29	DISASTER MITIGATION AND MANAGEMENT
CEE 30	IRRIGATION AND DRAINAGE ENGINEERING

## FIRST SEMESTER

Department : Civil Engineering					Programme : B. Tech. Civil Engineering				
Semester I									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	UE	Total	
T 101	MATHEMATICS – I	3	1	0	4	25	75	100	
Objective (s)		1. To introduce the idea of applying calculus concepts to problems in Engineering. 2. To familiarize the student with functions of several variables. 3. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage. 4. To introduce effective mathematical tools for the solutions of differential equations that model physical processes							
UNIT – I		Calculus				Total Hours : 9			
Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.									
UNIT – II		Function of Several variables				Total Hours : 9			
Partial derivatives, Total derivatives, Differentiation of implicit functions, Change of variables, Jacobians and their properties, Taylor’s series for functions of two variables, Maxima and minima, Lagrange’s method of undetermined multipliers.									
UNIT – III		Multiple Integrals and Applications				Total Hours : 9			
Multiple Integrals, change of order of integration and change of variables in double integrals (Cartesian to polar). Applications: Areas by double integration and volumes by triple integration (Cartesian and polar).									
UNIT – IV		Differential Equations				Total Hours : 9			
Exact equations, First order linear equations, Bernoulli’s equation, orthogonal trajectories, growth, decay and geometrical applications: Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.									
UNIT – V		Differential Equations (Higher order)				Total Hours : 9			
Linear differential equations of higher order – with constant coefficients, the operator D, Euler’s linear equation of higher order with variable coefficients - simultaneous linear differential equations, solution by variation of parameters method– simple applications to electric circuits									
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60			
Text Books									
1. Venkataraman, M. K, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Chennai 2010 (For units I, III, IV, V) 2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 41 <sup>st</sup> Edition, 2011. (For Unit II only)									
Reference Books									
1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008. 2. Kandasamy P. et al, Engineering Mathematics, Vol.1 & 2, S. Chand & Co., New Delhi. 3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 <sup>th</sup> Reprint, 2010. 4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New Delhi, 8th Edition. 5. Bali, N. P, and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007									

Department : Civil Engineering				Programme : B. Tech. Civil Engineering						
Semester I										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
T 102	PHYSICS			4	0	0	4	25	75	100
Objective (s)		1. To understand the concepts of physics and its significant contributions in the advancement of technology and invention of new products that dramatically transformed modern-day society. 2. To expose the students to different areas of physics which have direct relevance and applications to different Engineering disciplines 3. To understand the concepts and applications of Ultrasonics, optics and some optical devices, Lasers and Fiber optics, Nuclear energy sources and wave mechanics								
UNIT – I		Acoustics & NDT					Total Hours : 12			
Ultrasonics - Ultrasonic Waves Productions (Piezoelectric & Magnetostriction method) – Detections (Acoustic Grating). NDT application – Ultrasonic Echo method – Liquid Penetrant method. Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine’s formula for Reverberation Time – Doppler effect and its application to Random’s (elementary idea)										
UNIT – II		Optics					Total Hours : 12			
Interference - Air Wedge – Michelson’s Interferometer – Wavelength Determination – Interference Filter – Antireflection Coatings. Diffraction - Diffraction Grating – Dispersive power of grating - Resolving Power of Grating & Prism Polarisation – Basic concepts of Double Refraction - Huygens Theory of Double Refraction – Quarter and Half Wave Plates – Specific Rotary Power – Laurent Half Shade Polarimeter										
UNIT – III		Lasers & Fiber Optics					Total Hours : 12			
Lasers - Principles of Laser – Spontaneous and Stimulated Emissions - Einstein’s Coefficients – Population Inversion and Laser Action – Types of optical resonators(qualitative Ideas) – Types of Lasers - NdYAG, CO <sub>2</sub> laser, Ga As Laser – Application of Lasers. Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle. – Types of optical fibers (material, refractive index, mode)- Application to sensors and Fibre Optic communication.										
UNIT – IV		Wave Mechanics					Total Hours : 12			
Matter Waves – de Broglie Wavelength – Uncertainty Principle – Schrödinger Wave Equation – Time Dependent – Time Independent – Application to Particle in a One Dimensional potential Box – Quantum Mechanical Tunneling – Tunnel Diode.										
UNIT – V		Nuclear energy source					Total Hours : 12			
General Properties of Nucleus (Size, Mass, Density, Charge) – Mass Defect – Binding Energy - Disintegration in fission – Nuclear Reactor: Materials Used in Nuclear Reactors. – PWR – BWR – FBTR. Nuclear fusion reactions for fusion reactor – D-D and D-T reactions, Basic principles of nuclear fusion reactors.										
Total Contact Hours : 60		Total Tutorials : 0			Total Practical Class : 0			Total Hours : 60		
Text Books										
1. V Rajendran, Engineering Physics, 2 <sup>nd</sup> Ed., TMH, New Delhi 2011 (For Units I to IV only) 2. Arthur Beiser, Concept of Modern Physics, 6 <sup>th</sup> Ed, TMH, New Delhi 2008 (For Unit V Only)										
Reference Books										
1. Ajay Ghatak, Optics, TMH, New Delhi, 2007. 2. Thiagarajan and Ghatak, Laser and Application, TMH, New Delhi 2008. 3. R. Murugesan, Modern Physics, S. Chand & Co, New Delhi 2006 4. K.R.Nambiar, Lasers, New Age International, New Delhi, 2008 5. Science of Engineering Materials, 2nd Edition, C.M. Srivastava and C. Srinivasan, New Age Int. (P) Ltd,										

New Delhi, 1997

6. Avadhanulu M N Engineering Physics, Vol-I, S. Chand & Co, 2009.

Department : Civil Engineering				Programme : B. Tech. Civil Engineering						
Semester I										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
T 103	CHEMISTRY			4	0	0	4	25	75	100
Objective (s)		1. To know about the importance of Chemistry in Engineering domain 2. To understand the chemistry background of industrial process 3. To apply chemistry knowledge for engineering disciplines								
UNIT – I		Water						Total Hours : 12		
Hardness of water – units and calcium carbonate equivalent. Determination of hardness of water- EDTA method. Disadvantages of hardwater-boiler scale and sludge, caustic embrittlement, priming & foaming and boiler corrosion. Water softening method – internal & external conditioning – lime-soda process, zeolite process and ion exchange process. Desalination – reverse osmosis & electrodialysis										
UNIT – II		Polymers						Total Hours : 12		
Classification, types of polymerization reactions – mechanism of radical, ionic and Ziegler-Natta polymerizations. Polymer properties – chemical resistance, crystallinity and effect of temperature, Mn and Mw. Thermoplastics and thermosets. Preparation, properties and uses of PVC, TEFLON, Nylons, Bakelite, Polyurithane, Rubbers – vulcanization, synthetic rubber, BuNa-S, BuNa-N, silicone and butyl rubber. Conducting polymers – classification and applications. Polymer composites – FRP – laminar composites. Moulding constituents of plastic, moulding techniques – compression, injection, transfer and extrusion moulding										
UNIT – III		Electrochemical Cells						Total Hours : 12		
Galvanic cells, single electrode potential, standard electrode potential, electromotive series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen calomel, Ag /AgCl & glass electrodes. Batteries - primary and secondary cells, laclanche cell, lead acid storage cell, Ni-Cd battery & alkaline battery. Fuel cells - H <sub>2</sub> -O <sub>2</sub> fuel cell.										
UNIT – IV		Corrosion And Its Control						Total Hours : 12		
Chemical & electrochemical corrosion-Galvanic series-galvanic, pitting, stress and concentration cell corrosion. Factors influencing corrosion-corrosion control methods - cathodic protection and corrosion inhibitors. Protective coating - types of protective coatings-metallic coating-tinning and galvanizing, cladding, electroplating and anodizing										
UNIT – V		Phase Rule						Total Hours : 12		
Definition and derivation of phase rule. Application to one component system - water and sulphur systems. Thermal analysis, condensed phase rule. Two component alloy systems - Pb-Ag, Cu-Ni and Mg-Zn systems										
Total Contact Hours : 60			Total Tutorials : 0			Total Practical Class : 0			Total Hours : 60	
Text Books										
1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai and Sons, New Delhi 2010.										
Reference Books										
1. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. New Delhi., 2008.										
2. B. K. Sharma, Engineering Chemistry, 3 <sup>rd</sup> edition Krishna Prakashan Media (P) Ltd., Meerut, 2001										
3. P. Kannan and A. Ravi Krishnan “Engineering Chemistry” Hi-Tech Sri Krishna Publications, Chennai, 9th Ed, 2009										
4. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, 2 <sup>nd</sup> edition. PHI Learning PVT., LTD, New Delhi, 2008										



Department : Civil Engineering					Programme : B. Tech. Civil Engineering						
Semester I											
Course Code	Course Name				Hours / Week			Credit	Maximum Marks		
			L	T	P	C	IA	UE	Total		
T 104	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING				3	1	0	4	25	75	100
Objective (s)		1. To understand and gain basic knowledge about magnetic and electrical circuits, single phase and three phase power measurement and the operating principles of stationary and rotating machines 2. To understand the basic operation, functions and applications of PN junction diode, transistor, logic gates and flip flops. 3. To gain knowledge on various communication systems and network models and the use of ISDN									
		PART A – Electrical									
UNIT – I	DC Circuit							Total Hours : 10			
Definition of Voltage, Current, Power & Energy, circuit parameters, Ohm’s law, Kirchoff’s law & its applications – Simple Problems - Division of current in Series & parallel circuits - star/delta conversion - Node and mesh methods of analysis of DC circuits.											
UNIT – II	AC Circuit							Total Hours : 10			
Concepts of AC circuits – rms value, average value, form and peak factors – Simple RLC series circuits – Concept of real and reactive power – Power factor - Introduction to three phase system - Power measurement by two wattmeter method											
UNIT – III	Electrical Machines and Power Plants							Total Hours : 10			
Law of Electromagnetic induction, Fleming’s Right & Left hand rule - Principle of DC rotating machine, Single phase transformer and single phase induction motor (Qualitative approach only) - Simple layout of thermal and hydro generation (block diagram approach only).Fundamentals of fuses and circuit breakers											
		PART – B - Electronics									
UNIT – IV	Electronic Circuit							Total Hours : 10			
V-I Characteristics of diode - Half-wave rectifier and Full-wave rectifier – with and without capacitor filter - Transistor - Construction & working - Input and output characteristics of CB and CE configuration - Transistor as an Amplifier - Principle and working of Hartley oscillator and RC phase shift oscillator - Construction and working of JFET & MOSFET.											
UNIT – V	Digital Electronics							Total Hours : 10			
Boolean algebra – Reduction of Boolean expressions - De-Morgan’s theorem – Logic gates -Implementation of Boolean expressions - Flip flops - RS, JK, T and D. Combinational logic - Half adder, Full adder and Subtractors. Sequential logic - Ripple counters and shift registers.											
UNIT – IV	Communication and Computer Systems							Total Hours : 10			
Model of communication system – Analog and digital – Wired and wireless channel. Block diagram of various communication systems – Microwave, satellite, optical fiber and cellular mobile system. Network model – PAN, LAN, MAN and WAN – Circuit and packet switching – Overview of ISDN											
Total Contact Hours : 45		Total Tutorials : 15			Total Practical Class : 0			Total Hours : 60			
Text Books											
1. Kothari D P and Nagrath I J , Basic Electrical Engineering , Tata McGraw Hill,2009. (For Units I to III) 2. Rajendra Prasad , “ Fundamentals of Electronic Engineering”, Cengage learning, New Delhi, First Edition, 2011 (For Unit IV) 3. Morris Mano, “Digital design”, PHI Learning, Fourth Edition, 2008 (For Unit V) 4. Wayne Tomasi, “Electronic Communication Systems- Fundamentals Theory Advanced”, Sixth Edition, Pearson Education, 2004. (For Unit VI)											

### Reference Books

1. R.Muthusubramaniam, S.Salivahanan and K.A. Mureleedharan, Basic Electrical Electronics and Computer Engineering, Tata McGraw Hill, 2004..
2. J.B.Gupta, A Course in Electrical Power, Katson Publishing House, New Delhi, 1993.
3. David. A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Ltd, India, Fourth Edition, 2008
4. Donald P Leach, Albert Paul Malvino and Goutam Saha, “Digital Principles and Applications,” 6th edition, Tata McGraw Hill Publishing Company Ltd., New Delhi,2008.
5. S.K. Sahdev, Fundamentals of Electrical Engineering and Electronics, Dhanpat Rai & Co, 2013.
6. Jacob Millman and Christos C. Halkias, “Electronic Devices and Circuits” Tata McGraw Hill,2008
7. R.L. Boylestad and L. Nashelsky, “Electronic Devices and Circuit Theory”, PHI Learning Private Limited, Ninth Edition, 2008.
8. M.S.Sukhija and T.K.Nagsarkar, “ Basic Electrical and Electronics Engineering”, Oxford University Press, 2012

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Semester I								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
T 105	ENGINEERING THERMODYNAMICS	3	1	0	4	25	75	100
Objective (s)	<div>1. To understand the basics of the thermodynamic principles</div> <div>2. To establish the relationship of these principles to thermal system behaviors</div> <div>3. To develop methodologies for predicting the system behavior</div> <div>4. To establish the importance of laws of thermodynamics applied to energy systems</div> <div>5. To explain the role of refrigeration and heat pump as energy systems</div> <div>6. To develop an intuitive understanding of underlying physical mechanism and a mastery of solving practical problems in real world</div>							
UNIT – I	Basic Concepts and Definitions					Total Hours : 9		
Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics – P, V, and T Diagrams, - Thermodynamic Diagram.								
UNIT – II	First Law of Thermodynamics					Total Hours : 9		
The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases								
UNIT – III	Second Law of Thermodynamics					Total Hours : 9		
Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy								
UNIT – IV	Gas Power Cycles					Total Hours : 9		
Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies								
UNIT – V	Refrigeration Cycles and Systems					Total Hours : 9		
Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system - Liquifaction and solidification (only theory)								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Text Books								
1. Nag, P. K., “Engineering Thermodynamics”, 4 <sup>th</sup> edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi,1995								
Reference Books								
1. Arora, C.P., “Thermodynamics”, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi,1998.								
2. Burghardt, M.D., “Engineering Thermodynamics with Applications”, 4 <sup>th</sup> edition, Harper & Row, N.Y., 1986.								
3. Huang, F.F., “Engineering Thermodynamics” 2 <sup>nd</sup> edition , Macmillan Publishing Co.Ltd., N.Y.,1989.								
4. Cengel, Y.A. and Boles, M.A., "Thermodynamics - An Engineering Approach", 5 <sup>th</sup> edition, Mc-Graw Hill, 2006								
5. Wark, K., “Thermodynamics”, 4 <sup>th</sup> edition ,Mc Graw Hill, N.Y.,1985								

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Semester I										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
T 106	COMPUTER PROGRAMMING			3	1	0	4	25	75	100
Objective (s)		1. To introduce the basics of computers and information technology. 2. To educate problem solving techniques. 3. To impart programming skills in C language. 4. To practice structured programming to solve real life problems.								
UNIT – I								Total Hours : 9		
History of Computers – Block diagram of a Computer – Components of a Computer system – Classification of computers - Hardware – Software – categories of Software – Operating System – Applications of Computers – Network Structure - Internet and its services – Intranet – Study of word processor – Preparation of worksheets										
UNIT – II								Total Hours : 9		
Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code. Introduction to C – History of C – Importance of C - C tokens – data types – Operators and expressions – I/O functions										
UNIT – III								Total Hours : 9		
Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions . Storage classes – Strings – String library functions										
UNIT – VI								Total Hours : 9		
Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types– Union. Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and structures										
UNIT – V								Total Hours : 9		
Files – operations on a file – Random access to files – command line arguments . Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives										
Total Contact Hours : 45		Total Tutorials : 15			Total Practical Class : 0			Total Hours : 60		
Text Books										
1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, 12 <sup>th</sup> Edition, 2012										
Reference Books										
1. Vikas Verma, “A Workbook on C “,Cengage Learning, Second Edition,2012										
2. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2008.										

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Semester I								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
P 101	COMPUTER PROGRAMMING LAB	0	0	3	2	50	50	100
Objective (s)		1. To study and understand the use of OS commands						
		2. To gain a hands on experience of compilation and execution of ‘C’ programs						
List of Exercises								
<div>1. Study of OS Commands</div> <div>2. Write a C program to find the Area of the triangle.</div> <div>3. Write a C program to find the total and average percentage obtained by a student for 6 subjects.</div> <div>4. Write a C program to read a three digit number and produce output like<div>1 hundreds</div><div>7 tens</div><div>2 units for an input of 172.</div></div> <div>5. Write a C program to check whether a given character is vowel or not using Switch – Case statement.</div> <div>6. Write a C program to print the numbers from 1 to 10 along with their squares.</div> <div>7. Write a C program to find the sum of ‘n’ numbers using for, do – while statements.</div> <div>8. Write a C program to find the factorial of a given number using Functions.</div> <div>9. Write a C program to swap two numbers using call by value and call by reference.</div> <div>10. Write a C program to find the smallest and largest element in an array.</div> <div>11. Write a C program to perform matrix multiplication.</div> <div>12. Write a C program to demonstrate the usage of Local and Global variables.</div> <div>13. Write a C program to perform various string handling functions: strlen, strcpy, strcat, strcmp.</div> <div>14. Write a C program to remove all characters in a string except alphabets.</div> <div>15. Write a C program to find the sum of an integer array using pointers.</div> <div>16. Write a C program to find the Maximum element in an integer array using pointers.</div> <div>17. Write a C program to create student details using Structures.</div> <div>18. Write a C program to display the contents of the file on the monitor screen.</div> <div>19. Create a File by getting the input from the keyboard and retrieve the contents of the file using file operation commands.</div> <div>20. Write a C program to pass the parameter using command line arguments</div>								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 45	

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Semester I										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UA	Total
P 102	ENGINEERING GRAPHICS			2	0	3	2	25	75	100
Objective (s)	To convey the basics of engineering drawing To explain the importance of an engineering drawing To teach different methods of making the drawing To establish the importance of projects and developments made in drawing that are used in real systems To explain the role of computer aided design _Auto Cad To develop an intuitive understanding of underlying significance of using these drawings									
UNIT										
Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning										
UNIT – I										
Conic sections, Involute, Spirals, Helix. Projection of Points, Lines and Planes										
UNIT – II										
Projection of Solids and Sections of Solids										
UNIT – III										
Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)										
UNIT – IV										
Isometric projections and Orthographic projections										
UNIT – V										
Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning										
Total Contact Hours : 30			Total Tutorials : 0			Total Practical Class : 45			Total Hours : 75	
Text Books										
1. Gopalakrishna K.R. and Sudhir Gopalakrishna, Engineering Graphics, Inzinc Publishers, 2007.										
Reference Books										
1. Bhatt N.D., Engineering Drawing, 49 <sup>th</sup> edition, Chorotar Publishing House, 2006.										
2. Venugopal K., Engineering Drawing and Grahics + Auto CAD, 4 <sup>th</sup> edition, New Age International Publication Ltd., 2004 .										
3. David I cook and Robert N Mc Dougal, Engineering Graphics and Design with computer applications, Holt – Sounders Int. Edn. 1985.										
4. James D Bethune and et. al., Modern Drafting, Prentice Hall Int., 1989										
5. Natarajan K.V., A Text Book of Engineering Drawing, Dhanalakshmi Publishers, 2006. BIS, Engineering Drawing practice for Schools & College, 2006.										
6. BIS, Engineering Drawing practice for Schools & College, 1992.										

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Semester I								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
P103	<b>BASIC ELECTRICAL AND ELECTRONICS LAB</b>	0	0	3	2	50	50	100
<b>Objective (s)</b>	<div>1. To get an exposure on the basic electrical tools, applications and precautions</div> <div>2. To gain training on different types of wiring used in domestic and industrial applications.</div> <div>3. To detect and find faults in electrical lamp and ceiling fan</div> <div>4. To get an exposure on the measurements of voltage and phase using CRO, basic operation and applications of devices such as PN junction diode and transistor</div> <div>5. To gain a practical knowledge on the functions and application of basic logic gates and flip flops</div>							
<b>Electrical Laboratory Experiments</b>								
<div>1. Electrical Safety, Precautions, study of tools and accessories.</div> <div>2. Practices of different joints.</div> <div>3. Wiring and testing of series and parallel lamp circuits.</div> <div>4. Staircase wiring.</div> <div>5. Doctor’s room wiring.</div> <div>6. Bed room wiring.</div> <div>7. Godown wiring.</div> <div>8. Wiring and testing a ceiling fan and fluorescent lamp circuit.</div> <div>9. Study of different types of fuses, circuits breakers and A.C and D.C meters</div>								
<b>Electronics Laboratory Experiments</b>								
<div>1. Study of CRO<div>(a) Measurement of AC and DC voltages</div><div>(b) Frequency and phase measurements ( using Lissajou’s figures)</div></div> <div>2. Verification of Kirchoff’s Voltage and Current Laws<div>Determine the voltage and current in given circuits using Kirchoff’s laws theoretically and verify the laws experimentally.</div></div> <div>3. Characteristics and applications of PN junction diode.<div>Forward and Reverse characteristics of PN junction diode.</div><div>Application of Diode as Half wave Rectifier – Measurement of ripple factor with and without capacitor filter</div></div> <div>4. Frequency Response of RC Coupled Amplifiers<div>Determination of frequency response of given RC coupled amplifier - Calculation of bandwidth.</div></div> <div>5. Study of Logic Gates<div>(a) Verification of Demorgan’s theorems</div><div>(b) Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D</div><div>(c) Implementation of digital functions using logic gates and Universal gates</div></div>								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 45		

## SECOND SEMESTER

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
T 107	MATHEMATICS – II	3	1	0	4	25	75	100
Objective (s)	1. To develop the use of matrix algebra techniques for practical applications. 2. To introduce the concepts of Curl, Divergence and integration of vectors in vector calculus which is needed for many application problems. 3. To introduce Laplace transform which is a useful technique in solving many application problems and to solve differential and integral equations. 4. To acquaint the students with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic.							
UNIT – I	Matrices					Total Hours : 9		
Eigenvalues and Eigen vectors of a real matrix, Characteristic equation, Properties of Eigenvalues and Eigenvectors. Cayley-Hamilton Theorem, Diagonalization of matrices. Reduction of a quadratic form to canonical form by orthogonal transformation. Nature of quadratic forms..								
UNIT – II	Vector Calculus					Total Hours : 9		
Gradient, divergence and curl, their properties and relations. Gauss divergence theorem and Stoke’s theorem (without proof). Simple application problems								
UNIT – III	Laplace Transform					Total Hours : 9		
Definition, Transforms of elementary functions, properties. Transform of derivatives and integrals. Multiplication by t and division by t. Transform of unit step function, transform of periodic functions. Initial and final value theorems								
UNIT – IV	Applications of Laplace Transform					Total Hours : 9		
. Methods for determining inverse Laplace Transforms, convolution theorem, Application to differential equations and integral equations. Evaluation of integrals by Laplace transforms								
UNIT – V	Fourier Transform					Total Hours : 9		
Fourier Integral theorem (statement only), Fourier transform and its inverse, properties. Fourier sine and cosine transforms, their properties, convolution and Parseval’s identity.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Text Books								
1. Venkataraman M.K, Engineering Mathematics The National Publishing Company, Chennai, 2012. 2. Kandasamy P. et al, Engineering Mathematics, Vol.2 & 3, S. Chand & Co., New Delhi.								
Reference Books								
1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008. 2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi,41st Edition, 2011. 3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010. 4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New Delhi. 5. Bali N. and Goyal M., Advanced Engineering Mathematics, Lakshmi Publications Pvt. Ltd., New Delhi, 7th Edition, 2010								



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Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
T 108	MATERIAL SCIENCE	4	0	0	4	25	75	100
Objective (s)	1. To understand the importance of Material Science as a subject that revolutionized modern day technologies 2. To understand the significance of material science in the development of new materials and devices for all branches of Engineering 3. To impart knowledge to the Engineering students about some of the important areas of Materials Science so as to enable them perceive the significant contributions of the subject in Engineering and Technology							
UNIT – I	Crystal structure and Defects					Total Hours : 12		
Crystal structure - Bravais Lattices , Crystal Systems - Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices- Powder X Ray Diffraction Method Lattice defects – Qualitative ideas of point, line, surface and volume defects								
UNIT – II	Dielectric properties					Total Hours : 12		
Dielectric Polarization and Mechanism –Temperature dependence of polarization, Internal or local Field - Clausius-Mossotti relation. Basic ideas of Dielectric loss - frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric materials and Applications								
UNIT – III	Magnetic Properties					Total Hours : 12		
Origin of atomic magnetic moment – Bohr magneton-Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro, antiferro & Ferri). – Quantum theory of Para & Ferro Magnetism – Domain Theory of Hysteresis – Heisenberg Theory of Exchange Interaction (without derivation) – Qualitative ideas of Anti ferromagnetic Ordering – Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – Applications. Magnetic data storage – Magnetic tapes, Hard disks, Magneto optical recording								
UNIT – IV	Semiconductors and superconductors					Total Hours : 12		
Semiconductors -Derivation of Carrier concentration in intrinsic Semiconductors –Basic ideas of Electrical conductivity in intrinsic and extrinsic semiconductors (without derivations) -temperature dependence of carrier concentration and electrical conductivity in semiconductors (qualitative ideas), Hall effect in Semiconductors -- Application of Hall Effect, Basic Ideas of Compound Semiconductors (II-VI & III-V) Superconductivity - Basic concepts – transition temperature – Meissner effect – Type I and II superconductors – High Temperature Superconductors – 123 superconductor – Applications of superconductors.								
UNIT – V	Advanced Materials					Total Hours : 12		
Liquid Crystals – Types – Application as Display Devices Metallic Glasses – preparation by melt spinning. Twin roller system, properties and applications Shape Memory alloys (SMA), Shape memory effect, Properties and applications of SMA Nanomaterials- Nano materials (one, Two & three Dimensional) –Methods of synthesis (PVD, CVD, Laser Ablation, Solgel, Ball-milling Techniques), Properties and applications of nanomaterials. carbon nanotubes–synthesis, Properties and applications								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Text Books								
1. V Rajendran, Engineering Physics, 2nd Edition, TMH, New Delhi 2011.								

### Reference Books

1. Ali Omar M, Elementary Solid State Physics, Addison Wesley Publishing Co., 2009.
2. William D Callister Jr., Material Science and Engineering, 6th Edition, John Wiley and sons, 2009.
3. Charles Kittel, Introduction to Solid State Physics, 7th Edition, John Wiley & sons, Singapore, 2007.
4. V Raghavan , Materials Science and Engineering- A First Course, 5th Edition, Prentice Hall of India, 2008.
5. B.S. Murty, P. Shankar, Baldev Raj, B.B. Rath, and James Murday, Text book of Nanoscience and Nanotechnology, Universities Press, Hyderabad 2012
6. M.N. Avadhanulu, Enginerring Physics- Volume-II, S.Chand &Co, New Delhi, 2009
7. Pillai S.O, Solid State Physics, 6th Edition – New Age International, 2005.

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Semester II									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	UE	Total	
T 109	ENVIRONMENTAL SCIENCE	4	0	0	4	25	75	100	
Objective (s)	1. To know about the environment								
	2. To understand about environmental pollution								
	3. To apply the knowledge in understanding various environmental issues and problems								
UNIT – I	Environment And Energy Resources					Total Hours : 12			
Environmental segments – atmosphere, hydrosphere, lithosphere and biosphere. Atmospheric layers. Pollution definition and classification. Pollutants classification. Forest resources – use and over exploitation, deforestation, forest management. Water resources – use and conflicts over water, dams – benefits and problems. Mineralresources – mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources – world food problems, environmental impact of modern Agriculture – fertilizer and pesticides. Energy resources – growing needs, renewable and non-renewable energy resources and use of alternate energy sources. From unsustainable to sustainable development.									
UNIT – II	Ecosystem & Biodiversity					Total Hours : 12			
Concept of an ecosystem - structure and function of an ecosystem.Producers, consumers, and decomposers.Energy flow in the ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grassland, desert and aquatic (fresh water, esturine and marine) ecosystems. Biodiversity – definition, genetic species and ecosystem diversity. Value of biodiversity - consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity, habitat loss, poaching of wildlife, human wildlife conflicts. Endangered and endemic species. Conservation of biodiversity – in-situ and ex-situ conservation of biodiversity									
UNIT – III	Air Pollution					Total Hours : 12			
Definition and classification. Chemical and photochemical reaction in different layers of atmosphere. Causes, sources, effects and control measures of air pollutants - oxides of Nitrogen, oxides of Carbon, oxides of Sulfur, hydrocarbons, chloro-fluoro carbons and particulates. Mechanism and effects of air pollution phenomenon – Global Warming, Ozone Depletion, Acid Rain, Sulfurous Smog and Photochemical Smog									
UNIT – IV	Water and Land Pollution					Total Hours : 12			
Water pollution – causes and effects of organic water pollutants – pesticides, insecticides, detergents and surfactants. Causes and effects of inorganic water pollutants – heavy metal pollution due to Hg, Pb, Cr & Cu. Water pollution control and monitoring – DO, COD, BOD & TOC. Land Pollution – Solid waste management – causes, effect and control measures of urban and industrial wastes. Thermal and radioactive pollution									
UNIT – V	Pollution Control and Monitoring					Total Hours : 12			
Basic concepts and instrumentation of IR, UV-VIS, atomic absorption spectrometry, Gas Chromatography and Conductometry. Analysis of air pollutants – NO <sub>x</sub> , CO <sub>x</sub> , SO <sub>x</sub> , H <sub>2</sub> S, Hydrocarbons and particulates									
Total Contact Hours : 60		Total Tutorials : 0			Total Practical Class : 0			Total Hours : 60	
Text Books									
1. Raghavan Nambiar K., “Text Book of Environmental Studies” 2 <sup>nd</sup> edition, Scitech Publications, India, Pvt. Ltd, Chennai, 2008.									
2. A.K. De, “Environmental chemistry” 6 <sup>rd</sup> edn; New age international (P) Ltd, New Delhi, 2006									
Reference Books									
1. B.K. Sharma, “Environmental chemistry” 11th Ed, KRISHNA Prakashan Media (P) Ltd, Meerut, 2007.									
2. S.S.Dara, and D.D. Mishra “A text book of environmental chemistry and pollution control, 5th Ed, S.Chandand Company Ltd, New Delhi, 2012.									
3. Richard T. Wright, Environmental Science: Toward a Sustainable Future, 10thedition, Prentice Hall, 2008									
4. G. S. Sodhi, Fundamental concepts of environmental chemistry, I Ed, Alpha Science International Ltd, India, 2000									

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Semester II										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
T 110	BASIC CIVIL AND MECHANICAL ENGINEERING			4	0	0	4	25	75	100
Objective (s)		1. To be able to differentiate the types of buildings according to national building code. 2. To understand building components and their functions as well as different types of roads, bridges and dams 3. To explain the concepts of thermal systems used in power plants and narrate the methods of harnessing renewable energies 4. To explain the role of basic manufacturing processes 5. To develop an intuitive understanding of underlying working principles of mechanical machines and systems								
		PART - A Civil Engineering								
UNIT – I		Buildings, Building Materials						Total Hours : 10		
		Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.								
UNIT – II		Buildings and their components						Total Hours : 10		
		Buildings- Various Components and their functions. Soils and their classification Foundations-Functions and types of foundations, Masonry Function and types, Floors-Definition and types, Roofs Definition and types.								
UNIT – III		Basic Infrastructure						Total Hours : 10		
		Surveying-classification, general principles, types, uses, instruments used. Roads - Components, types and their advantage and disadvantage. Bridges-components and types of bridges. Dams-Purpose, need & Principles, types of dams and components. Water supply-sources and quality requirements. Rainwater harvesting								
		PART - B Mechanical Engineering								
UNIT – IV		Internal and external combustion systems						Total Hours : 10		
		IC engines – Classification – Diesel and petrol engines: two stroke and four stroke engines. Merits and demerit Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories. Merits and .demerits- Application.								
UNIT – V		Power Generation Systems						Total Hours : 10		
		Conventional and Non-Conventional: Hydraulic – Thermal – Nuclear power plants – Schemes and layouts (Description Only) – Solar – Wind – Geothermal – Wave – Tidal and Oceans thermal Energy Conversion systems – Basic power plant schemes and layouts (Description only)								
UNIT – VI		Manufacturing Process						Total Hours : 10		
		Machines – Lathe – Drilling – Bending – Grinding – Shearing (Description only) Machining Processes – Turning – Planning – Facing – Blanking – Drilling – Punching – Shearing – Bending – Drawing – Filing – Sawing – Grinding. Moulding and Metal Joining - Pattern making – Green and dry sand moulding – Arc and Gas welding – Brazing – Soldering (process description only).								
Total Contact Hours : 60		Total Tutorials : 0			Total Practical Class : 0			Total Hours : 60		
Text Books										
1.		Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications Chennai, 2011. (For Units I to III)								

2. Venugopal , K and Prabhu Raja, Basic Mechanical Engineering, Anuradha Publisher , 2012 (For Units IV to VI).

#### **Reference Books**

1. Purushothama Raj.P., Basic civil engineering, 3rd Edn., Dhanam Publications, Chennai,2001
2. Rajput, R K, Engineering Materials, S Chand & Co. Ltd., New Delhi, 2012.
3. Punmia, B.C., et. al., Surveying , Vol-I, Laxmi Publishers, New Delhi, 2012.
4. Punmia, B.C., et.al Building Construction, Laxmi Publishers, New Delhi ,2012.
5. El.Wakil, M.M., Power Plant Technology, Mc Graw Hill Book Co.,1985.
6. Hajra Choudhry, et. al., Workshop Technology Vol I and II, Media Promoters Publishers Pvt. Ltd., Bombay, 2004.
7. Lindberg, R.A.Process and Materials of Manufacture, PHI, 1999.
8. H.N.Gupta, R.C.Gupta and Arun Mittal, Manufacturing Processes, New Age Publications, 2001
9. Nagpal, Power Plant Engineering, Khanna Publishers, Delhi, 1998.

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
T 111	ENGINEERING MECHANICS	3	1	0	4	25	75	100
Objective (s)	1. To understand the vector and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two dimensions							
	2. To comprehend the effect of friction on equilibrium							
	3. To understand the laws of motion, the kinematics of motion and the interrelationship and to learn to write the dynamic equilibrium equation							
	4. To emphasis the concepts through solved examples							
UNIT – I	Fundamental of Mechanics					Total Hours : 9		
Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon’s theorem, Resultant of force system – Concurrent and non-concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, applications in solving the problems on static equilibrium of bodies								
UNIT – II	Practical Application of Force System					Total Hours : 9		
Structural member: definition, Degree of freedom, concept of free body diagrams, types of supports and reactions, types of loads, Analysis of Trusses-method of joints, method of sections. Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges								
UNIT – III	Properties of Surfaces					Total Hours : 9		
Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia								
UNIT – IV	Kinematics and Kinetics of Particles					Total Hours : 9		
Equations of motion - Rectilinear motion, curvilinear motion, Relative motion, D’Alembert’s principle, work-Energy equation – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.								
UNIT – V	Kinematics and Kinetics of Rigid bodies					Total Hours : 9		
Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Text Books								
1. Rajesekaran, S and Sankara Subramanian., G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2012.								
Reference Books								
1. Palanichamy, M.S. Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill,2001.								
2. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol.2 Dynamics, McGraw – Hill International Edition, 1997								
3. Bhavikatti,S.S and K.G.Rajashekarappa, Engineering Mechanics, New Age International (P) Ltd, New Delhi,2010								

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
T112	COMMUNICATIVE ENGLISH	4	0	0	4	25	75	100
Objective (s)	To improve the LSWR skills of I B.Tech students							
	To instill confidence and enable the students to communicate with ease							
	To equip the students with the necessary skills and develop their language prowess							
UNIT – I	Basic Communication Theory					Total Hours : 12		
Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills								
UNIT – II	Comprehension And Analysis					Total Hours : 12		
Comprehension of technical and non-technical material – Skimming, scanning, inferring-Note making and extension of vocabulary, predicting and responding to context- Intensive Reading and Reviewing								
UNIT – III	Writing					Total Hours : 12		
Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc								
UNIT – IV	Business Writing / Correspondence					Total Hours : 12		
Report writing – Memoranda – Notice – Instruction – Letters – Resumes – Job applications								
UNIT – V	Oral Communication					Total Hours : 12		
Basics of phonetics – Presentation skills – Group Discussions – Dialogue writing – Short Extempore – Debates-Role Plays-Conversation Practice								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Text Books								
1. Robert J.Dixon. ,Complete Course in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2006								
Reference Books								
1. Ashraf M.Rizvi., Effective Technical Communication. Tata-McGraw, 2005.								
2. Boove, Courtland R et al., Business Communication Today. Delhi. Pearson Education ,2002.								
3. Meenakshi Raman and Sangeeta Sharma., Technical Communication Principles And Practice,OUP, 2007.								
4. Robert J.Dixon., Everyday Dialogues in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2007.								
5. Sethi,J and Kamalesh Sadanand., A Practical Course in English Pronunciation, Prentice-Hall of India Pvt. Ltd, New Delhi,2007.								

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P		C	IA	UE
P 104	PHYSICS LABORATORY	0	0	3	2	50	50	100
Objective (s)		To provide a practical understanding of some of the concepts learnt in the theory course on Physics.						
		List of experiments (Any 10 Experiments)						
<div>1. Thermal conductivity – Lee’s DISC</div> <div>2. Thermal conductivity - Radial flow</div> <div>3. Spectrometer – Prism or Hollow prism</div> <div>4. Spectrometer – Transmission grating</div> <div>5. Spectrometer - Ordinary &amp; Extraordinary rays</div> <div>6. Newton’s rings</div> <div>7. Air – wedge</div> <div>8. Half shade polarimeter – Determination of specific rotatory power</div> <div>9. Jolly’s experiment – determination of <math>\alpha</math></div> <div>10. Magnetism: i – h curve</div> <div>11. Field along the axis of coil carrying current</div> <div>12. Vibration magnetometer – calculation of magnetic moment &amp; pole strength</div> <div>13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) &amp; particle size determination</div> <div>14. Determination of optical absorption coefficient of materials using laser</div> <div>15. Determination of numerical aperture of an optical fiber</div> <div>16. Electrical conductivity of semiconductor – two probe / four probe method</div> <div>17. Hall effect in semiconductor</div>								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 45	



Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
P105	CHEMISTRY LABORATORY	0	0	3	2	50	50	100
Objective (s)	To gain practical knowledge on engineering Chemistry in relevance to Industrial Application							
List of experiments (Any 10 Experiments)								
1. Determination of dissolved oxygen in water. 2. Determination of total hardness of water by EDTA method. 3. Determination of carbonate and bicarbonate in water. 4. Estimation of chloride content in water. 5. Estimation of magnesium by EDTA. 6. Estimation of vinegar. 7. Estimation of ferrous by permanganometry. 8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry. 9. Estimation of available chlorine in bleaching powder. 10. Estimation of copper in copper sulphate solution. 11. Estimation of calcium by permanganometry. 12. Estimation of iron by colorimetry								
Demonstration Experiments( Any two of the following )						Total Hours : 9		
1. Determination of COD of water sample.  2. Determination of lead by conductometry. 3. Percentage composition of sugar solution by viscometry								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 45	

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester II								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
P 106	WORKSHOP PRACTICE	0	0	3	2	50	50	100
Objective (s)	To convey the basics of mechanical tools used in engineering To establish hands on experience on the working tools To develop basic joints and fittings using the hand tools To establish the importance of joints and fitting in engineering applications To explain the role of basic workshop in engineering To develop an intuitive understanding of underlying physical mechanism used in mechanical machines.							
I	Fitting							
Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle 1. Study of tools and Machineries 2. Symmetric fitting 3. Acute angle fitting								
II	Welding							
Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding 1. Study of arc and gas welding equipment and tools 2. Simple lap welding (Arc) 3. Single V butt welding (Arc)								
III	Sheet metal work							
Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray 1. Study of tools and machineries 2. Funnel 3. Waste collection tray								
IV	Carpentry							
Study of tools and Machineries – Exercises on Lap joints and Mortise joints 1. Study of tools and machineries 2. Half lap joint 3. Corner mortise joint								
Total Contact Hours : 0		Total Tutorials : 0			Total Practical Class : 45		Total Hours : 45	

### **P107 NCC / NSS**

NCC/NSS training is compulsory for all Undergraduate students

1. The activities will include Practical/field activities/Extension lectures.
2. The activities shall be carried out outside class hours.
3. For the above activities, the student participation shall be for a minimum period of 45 hours.
4. The activities will be monitored by the respective faculty in charge and the First Year Coordinator.
5. Pass /Fail will be determined on the basis of participation, attendance, performance and behavior. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree

### III SEMESTER

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P		C	IA	UE
MA T31	MATHEMATICS – III	3	1	0	4	25	75	100
Objective (s)		1. To provide the concepts of functions of a complex variable, conformal mapping, complex integration, series expansion of complex functions, Harmonic analysis and Fourier series. 2. To make the students understand and work out problems of constructing analytic functions, conformal mapping, bilinear transformation, contour integration and expanding functions into Fourier series including Harmonic analysis						
UNIT – I	Function of a complex variable					Total Hours : 9		
Continuity, derivative and analytic functions – Necessary conditions – Cauchy-Riemann equations (Cartesian and polar form) and sufficient conditions (excluding proof) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions								
UNIT – II	Conformal mapping					Total Hours : 9		
Simple and standard transformations like $w = z+c$ , $cz$ , $z^2$ , $e^z$ , $\sin z$ , $\cosh z$ and $z+1/z$ – Bilinear transformation and cross ratio property (excluding Schwarz-Christoffel transformation). Taylor’s and Laurent’s theorem (without proof) – Series expansion of complex valued functions – classification of singularities								
UNIT – III	Complex Integration:					Total Hours : 9		
Cauchy’s integral theorem and its application, Cauchy’s integral formula and problems. Residues and evaluation of residues – Cauchy’s residue theorem – Contour integration: Cauchy’s and Jordan’s Lemma (statement only) – Application of residue theorem to evaluate real integrals – unit circle and semicircular contour (excluding poles on boundaries)								
UNIT – IV	Fourier Series:					Total Hours : 9		
Dirichlet’s conditions – General Fourier series – Expansion of periodic function into Fourier series – Fourier series for odd and even functions – Half-range Fourier cosine and sine series – Change of interval – Related problems.								
UNIT – V	Root Mean Square Value					Total Hours : 9		
Parseval’s theorem on Fourier Coefficients. Complex form of Fourier series – Harmonic Analysis.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		On successful completion of the module students will be able to: 1. Understand the concepts of function of a complex variable and complex integration and apply these ideas to solve problems occurring in the area of engineering and technology. 2. Expand functions into Fourier series which are very much essential for application in engineering and technology						
Text Books								
1. Veerarajan T., Engineering Mathematics for first year, Tata-McGraw Hill, 2010. 2. Venkataraman M.K., Engineering Mathematics, Vol. II & III, National Publishing Company, Chennai, 2012.								

**Reference Books**

1. Kandasamy P. et al, Engineering Mathematics, Vol. II & III, S. Chand & Co., New Delhi, 2012.
2. Bali N. P and Manish Goyal, Text book of Engineering Mathematics, 3rd Edition, Laxmi Publications (p) Ltd., 2008.
3. Grewal B.S., Higher Engineering Mathematics, 40th Edition, Khanna Publishers, Delhi 2007.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 7Th Edition, Wiley India, (2007).

Department : Civil Engineering				Programme: B.Tech. Civil Engineering				
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CET32	<b>GEO SCIENCE ENGINEERING</b>	4	0	0	4	25	75	100
<b>Objective (s)</b>	1. To familiarize the students to interior of the earth, plate tectonics, geomorphological processes and their significance in civil Engineering. 2. To provide an insight on minerals, rocks and their geological characteristics to understand their effects and significance in various areas of civil Engineering. 3. Facilitate the students to understand various defects associate with geological formations and to emphasize their significance in the selection of site for various structures.							
<b>UNIT – I</b>	<b>General Geology</b>	Total Hours : 12						
Scope of geology in Civil Engineering – interior of the earth- Fundamentals of plate tectonics - geomorphological (surface) processes –weathering – types , weathered products, assessment of degree of weathering , Fluvial processes, glaciations , wind action, their land forms and their significance in Civil Engineering – earthquake, its causes, classification, earthquake zones of India, - Landslides, its causes, classification and remediation.								
<b>UNIT – II</b>	<b>Mineralogy</b>	Total Hours : 12						
Physical properties of minerals – classification - study of important rock forming minerals –Quartz family, feldspar family, Augite, Hornblend, Mica family, calcite, Iron oxide minerals, Augite, Hornblend, and Clay minerals - effect of minerals on the performance of soils and rocks.								
<b>UNIT – III</b>	<b>Petrology</b>	Total Hours : 12						
Classification of rocks - mode of formation – Texture, structure and forms of igneous, sedimentary and metamorphic rocks - Physical properties, Mechanical properties of rocks-. Study of important rocks - granite, syenite, diorite, gabbro, pegmatite, dolerite , basalt , sand stone, limestone, shale, breccia , conglomerate, gneiss, quartzite, marble, slate, schist, phyllite and conglomerate - role of petrology in the field of construction.								
<b>UNIT – IV</b>	<b>Structural geology and Geophysical methods</b>	Total Hours : 12						
Attitude of beds - out crops, study of structural features such as folds, faults, joints, unconformities ,their brief classification and their bearing on engineering construction – principles of geophysical methods, electrical resistivity method , seismic method and its applications in civil engineering								
<b>UNIT – V</b>	<b>Geological applications</b>	Total Hours : 12						
Role of geology in site investigation, Geotechnical classification of rock, geological considerations in tunnels and dam site, reservoir site, buildings, road cuttings, study of air photographs and satellite images and interpretation for civil engineering projects, groundwater- types of aquifers , properties of geological formations affecting groundwater and its significance in construction.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		Student will be familiarized with plate tectonics, earthquakes, land forms, minerals, rocks, structural defects and their significance to find the engineering solutions to various problems in the field of construction.						
<b>Text Books</b>								
1.Chenna Kesavulu.N, “Engineering Geology “, Macmillan Publishers Pvt. Ltd., 2009 2. Varghese, P.C,” Engineering Geology for Civil Engineers”, Prentice-hall of India Pvt.Ltd., 2012.								
<b>Reference Books</b>								
1. Leggot, R.F.,” Geology and Engineers “, McGraw Hill , New York.2002 2. Blyth, F.G.M., “A Geology for Engineers”, Arnold, London, 2003. 3. Bell.F.G, “ Fundamentals of Engineering Geology” Butterworth-Heinemann, 1983. 4. Bell. F.G. “ Engineering Geology” Elsevier publications, 2007								

Department : Civil Engineering				Programme : B.E. Civil Engineering				
Semester-III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T33	BUILDING TECHNOLOGY	4	0	0	4	25	75	100
Objective (s)	1. To understand the building material, characterization and its application 2. To acquire knowledge on conventional and unique technology of construction in building							
UNIT – I	Building Materials				Total Hours : 12			
Lime, Timber and its Products, Floor and Wall Tiles, Pozzolanas, Ferrous metals, Thermal Insulation								
UNIT – II	Finishing and Perfective materials				Total Hours : 12			
Finishing Materials: Glass, Aluminium, Plastics, Paints, Varnishes, Distemper, Waterproofing and Damp Proofing Materials, Ferrocement and its application.								
UNIT – III	Components of building and Treatment				Total Hours : 12			
Partition wall and Cavity wall, Composite Masonry, Doors, Windows, Ventilators, Stairs, Lift, Ramps, Escalators, Anti Termite Treatment								
UNIT – IV	Plumbing and Temp, Structures				Total Hours : 12			
Materials for Plumbing and Sanitation, Fire Protection, Temporary Structures, Introduction to Building Maintenance.								
UNIT – V	Modern Techniques				Total Hours : 12			
Principles of Energy Efficient Buildings, Disasters Resistant Buildings (as per IS), Ventilation and Air Conditioning, Cost - effective Construction Techniques								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Out come	1. One should have required knowledge on certain special and finishing meterials . 2. Should have acquired, knowledge on construction techniques in both material and finishing.							
Text Books								
1. Bhavikatti.S.S., Building Materials, Vikas Publishing House.Pvt. Ltd., New Delhi, 2012. 2. Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publishing (P).Ltd., New Delhi-2, 2012.								
Reference Books								
1. Rajput, R.K., Engineering Material, S.Chand &Co. Ltd., New Delhi, 2008. 2. Bhavikatti.S.S.,Building Technology, Vikas Publishing House. Pvt. Ltd., New Delhi, 2013. 3. Shrivastava.U.K, Building Materials Technology, Galgotia Publications Pvt., Ltd., 2012. 4. Varghese, P.C, Building Materials, Prentice-hall of India Pvt.Ltd., 2013.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester-III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T34	MECHANICS OF SOLIDS - I	3	1	0	4	25	75	100
Objective (s)	1. To develop an understanding of the relationship between external loads applied to a deformable body and the internal stress, strain and deformation induced in the body. 2. To show proficiency in mathematics and basic sciences required to solve structural engineering and mechanics problem. 3. To develop analytical and graphical problem solving skills.							
UNIT – I	Stresses & Strains				Total Hours : 9			
Simple Stresses and Strains – Tension, compression and shear stresses - Hooke's law - compound stresses - thermal stresses – Compound bars.								
UNIT – II	Bending Stresses				Total Hours : 9			
Shear force and bending moment diagrams for beams - Theory of simple bending – Bending stress distribution at sections. Beams of uniform strength.								
UNIT – III	Shear stress				Total Hours : 9			
Shear stress distribution due to bending – Shear Centre. Springs – Stiffness – parallel, series - Problems Complex stresses – Principal planes and stresses-Mohr’s circle.								
UNIT – IV	Torsion				Total Hours : 9			
Theory of simple Torsion – Torsional rigidity – Torsion of non-circular sections – Composite shafts in series and parallel. Thin cylinders and shells – Thick cylinders.								
UNIT – V	Columns				Total Hours : 9			
Columns – Euler’s theory – Rankine – Jordon formula – Columns with initial curvature and eccentric loads –Long columns- Laterally loaded columns, Stability Check for masonry dams and retaining walls								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Out come	1. Calculate and understand the concepts of stress and strain; 2. Calculate, describe, and estimate external loadings, including axial load, shear force, bending, and torsion, and internal stresses associated with these external loadings; 3. calculate internal stresses and strains through the application of stress transformation equations and Mohr’s circle; 4. Understand stability and buckling phenomena for a slender member under an axial load compressive force							
Text Books								
1 Bhavikatti. S.S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2012. 2 Bansal.R.K., A Text book of Strength of Materials, Laxmi Publications (P) Ltd, New Delhi, 2012.								
Reference Books								
1 Shah.H.J. and Junnarkar.S.B., Mechanics of structures- Vol.I, Charotar Publishing house, Ltd., 2012. 2 Surendra Singh, Strength of Materials, Vikas Publishing House, 2013 3 Rattan, S.S., Strength of Materials, Tata McGraw-Hill, 2011. 4 Ramasamy.V, Purushothama Raj.P, Strength of Materials, Pearson Education Ltd., 2012								



Department : Civil Engineering				Programme : B.Tech. Civil Engineering					
Semester III									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	UE	Total	
CE T35	MECHANICS OF FLUIDS	3	1	0	4	25	75	100	
Objective (s)	1. To make the student to understand the basic properties of fluids and principles of mechanics of fluids. 2. To apply the above principle for solving typical elementary filed problems								
UNIT – I	Fluid properties					Total Hours : 9			
Density, Specific Weight, Specific Volume, Specific gravity, Compressibility, Viscosity, surface tension, capillarity, vapour pressure. Fluid Statics: Pressure in a fluid, pressure head, Measurement of pressure. Hydrostatic forces on submerged plane and curved surfaces, Buoyancy, Metacentre, Stability of floating and submerged bodies.									
UNIT – II	Fluid Kinematics					Total Hours : 9			
Stream line, streak line, path line and stream tube. Types of flow, steady , unsteady, uniform, non- uniform, laminar, turbulent, rotational and irrotational flows. Equation of continuity for one, two, three dimensional flows, stream function and velocity potential function, flow net analysis. Dynamics of flow: Euler’s equation of motion, Bernoulli’s equation, simple applications of Bernoulli’s equation, Momentum equation. Kinetic energy and Momentum correction factors.									
UNIT – III	Boundary Layer Theory					Total Hours : 9			
Boundary Layer thickness, Displacement thickness, Momentum thickness, Energy thickness, Boundary layer growth and separation. Laminar flow: Laminar flow through pipes, Hagen- poissuille flow, energy loss. Turbulent flow: Turbulent flow through pipes, Darcy’s equation, Minor losses, Energy and Hydraulic gradients, pipes in series and parallel.									
UNIT – IV	Flow measurement					Total Hours : 9			
Pitot tube, Venturimeter, Orificemeter, Flow nozzle, and mouthpieces, flow over notches and weirs, Venturiflume and standing wave flume, Velocity measurement in open channel.									
UNIT – V	Dimensional Analysis and Similitude					Total Hours : 9			
Dimensional analysis- Rayleigh’s method, Buckingham’s fi theorem, Dimensionless numbers, Laws of similitude, Model Analysis, Distorted models, Principles of analogy.									
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60			
Programme Out come	The student should have a through basic understanding of mechanics of fluids and use the knowledge to identify elementary practical problems and solve them.								
Text Books									
1. Modi,P.N.,and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book House, New Delhi, 2014. 2. Rajput,R.K., Text Book of fluid Mechanics and Hydraulic Machinery, S.Chand & Company, (P)Ltd., New Delhi, 2014.									
Reference Books									
1. Douglas,J.F., Gasiorek,J.M and Swaffield,J.A., Fluid Mechanics 4 <sup>th</sup> Edn.Pearson Education India,2008. 2. Das M.M Fluid Mechanics and Turbimachines, Prentice Hall of India(P) Ltd New Delhi, 2008. 3. Sukumar Pati, Text book of Fluid Mechanics & Hydraulic Machines, Tata McGraw-Hill, 2012. 4. Rajput, R.K., Fluid Mechanics & Hydraulic Machines, S.Chand Group, 2014									

Department : Civil Engineering					Programme : B.Tech. Civil Engineering						
Semester III											
Course Code	Course Name				Hours / Week			Credit	Maximum Marks		
					L	T	P	C	IA	UE	Total
CET36	SURVEYING - I				3	1	0	4	25	75	100
Objective (s)		1. Understand the basic concepts of surveying and able to solve problems associated with linear measurements and error correction. 2. Gain the basics of compass surveying and able to understand the system of coordinates and angular measurement for the purpose of traversing. 3. Learn various methods of taking levels and reducing levels									
UNIT – I		Chain Compass and Plane Table Surveying							Total Hours : 9		
CHAIN : Definition – Principles – Classification – field and office work. COMPASS : Prismatic compass – Surveyor’s compass – Bearing systems and conversions – Local attraction – Magnetic declination – dip PLANE TABLE SURVEYING : Plane table instruments and accessories – merits and demerits – methods – Radiation- Intersection – Resection											
UNIT – II		Leveling and applications							Total Hours : 9		
Basic terms and definitions – Methods of levelling – levels and staves- temporary and permanent adjustments –Direct levelling – Differential levelling - booking and reducing Levels – Balancing of sights curvature and refraction- reciprocal levelling- longitudinal and cross sections- traversing –Levelling problems – errors in Levelling Contouring – methods – characteristic and use of contours – plotting											
UNIT – III		Theodolite Surveying							Total Hours : 9		
Theodolite – Vernier and microptic – Description and uses – Temporary and permanent adjustments of vernier transit – Horizontal angles – Vertical angles – Trigonometrical Levelling- Heights and distances – Traversing – Closing error and distribution – Gale’s tables – Omitted measurements.											
UNIT – IV		Area & Volume calculation , setting out works							Total Hours : 9		
Areas and Volumes-Areas enclosed by straight lines – Irregular figures – volume – earthwork calculations – capacity of reservoirs – mass – haul diagrams. Reconnaissance – preliminary and location surveys for engineering projects – Lay out – Setting out works – Route Surveys for highways – Railways and waterways											
UNIT – V		Tacheometric Surveying							Total Hours : 9		
Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems – Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar											
Total Contact Hours : 45			Total Tutorials : 15			Total Practical Class : 0			Total Hours : 60		
Programme Outcome		At the end of the course the students will posses knowledge about Chain surveying, Compass surveying, Plane table surveying, Levelling, Theodolite surveying and Engineering surveys									
Text Books											
1. Punmia .B.C . , et .al..” Surveying “, Vols, I, Laxmi Publications, 2012 2. Kanetkar, T.P. ,Surveying and leveling, Vols. I & II, United book corporation, Pune 2012											
Reference Books											
1. Kanetkar, T.P., and Kulkarni,S.V., Surveying and Levelling, Part I, United book Corporation, Pune. 2012. 2. Shahani, P.B., Text book of Surveying, Vol.I, Oxford &IBH Publications, 2012.											

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P31	<b>SURVEYING LABORATORY - I</b>	0	0	3	2	50	50	100
Prerequisite	Nil							
Objective (s)	1. To train the students handling instruments used for surveying. 2. To make the students to understand various problems in linear and angular measurement associated with field application							
	<b>List of Experiments</b>							
1. Simple chain survey – calculation of area using cross staff 2. Compass Surveying - Measurement of bearing of survey lines by prismatic compass 3. Plane Table Surveying - Radiation and Intersection methods 4. Reduction of Levels: (i) Height of Collimation (ii) Rise and Fall method 5. Taking levels of longitudinal section and cross sections of a road plotting 6. Plotting of perpendicular and Oblique offsets 7. Plotting of contours from Radial methods and block leveling 8. Setting out Grades for Road profile 9. Alignment of Sewer lines 10. Study on Tacheometric Surveying using Electronic Theodolite 11. Determination of Heights and Distance by : (i) Stadia Hair Method (ii) Tangential Tacheometry								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 45		
<b>Programme Outcome</b>	To provide hands on exercise and make the students to learn the basics of field oriented problems in surveying							

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P32	<b>MATERIALS TESTING LABORATORY - I</b>	0	0	3	2	50	50	100
<b>Objective (s)</b>	To understand the preparation of a specimen for the desired strength of materials in relating to the analysis and design of various structural elements							
1. Tension Test on Mild steel and Tor Steel rod specimens 2. Direct Shear Test on Steel Rod Specimens 3. Bend and Re-bend Test on Steel Rod Specimens 4. Brinell Hardness Test on Metal Specimens 5. Rockwell Hardness Test on Metal Specimens 6. Vickers Hardness Test on Metal Specimens 7. Impact Test on Metal Specimens using Izod arrangement 8. Impact Test on Metal Specimens using Charpy arrangement 9. Ductility Test on Sheet metals using Erichsen Cupping 10. Torsion Test on Metal Specimens- 11. Fatigue Test on Metal Specimens- Demonstration only 12. Spring Test- Demonstration only 13. Compression Test on wood Specimens- Parallel and Perpendicular to the Grains- 14. Direct Shear Test on Wood Specimens 15. Direct Tension Test on Wood Specimens 16. Static Bend Test on Wood Specimens								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 45		
<b>Programme Out come</b>	The course will enable the students to evaluate the mechanical properties of materials subjected to the loads and report and verify the same as per Indian standards available and know where the mechanical property is used in the engineering design.							

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester III								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P33	<b>BUILDING PLANNING AND DRAWING</b>	2	0	3	2	50	50	100
<b>Objective (s)</b>	1.To understand the Functional Planning and architectural design of buildings 2. To develop skills in manual and Autocad drafting of building plans, elevation and sections							
<b>Theory</b>								
1. Functional planning – Introduction to anthropometrics and ergonomics – Occupancy classification of Buildings –Essentials of National Building Code – Essentials of Building and development rules – Introduction to green building. 2. Building Physics : Sun's movement and building: Sun control devices –Exposed walls and Openings 3. Lighting and acoustics 4. Introduction to AutoCAD – Draw and modify tools- Dimensioning-Layers- Blocks-Printing- Two dimensional drawing <i>3D commands</i> .								
		<b>Plates to be submitted in AUTOCAD</b>						
1. Door, Windows, Ventilators. 2. Foundation, Staircase 3. Residential buildings – Plan, Section, Elevations (Using Mini Drafter and AutoCad) 4. Public buildings like office, dispensary, post office, bank etc. 5. Industrial buildings								
Total Contact Hours : 30		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 75	
<b>Programme Outcome</b>		Ability to develop a concept drawing based on the requirements Ability to draft a Approval Drawing in AutoCAD.						

## IV SEMESTER

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
MA T41	MATHEMATICS - IV	3	1	-	4	25	75	100
Objective (s)	1. Importance of problems in Partial Differential Equations 2. Problem solving techniques of PDE 3. To make the students knowledgeable in the areas of Boundary Value Problems like vibrating string (wave equation), heat equation in one and two dimensions. 4. To acquaint the students with the concepts of Theory of sampling							
UNIT I					Total hours : 9			
Formation by elimination of arbitrary constants and arbitrary functions – General, singular, particular and integrals – Lagrange’s linear first order equation – Higher order differential equations with constant coefficients								
UNIT II					Total hours : 9			
Solution of partial differential equation by the method of separation of variables – Boundary value problems – Fourier series solution – Transverse vibration of an elastic string.								
UNIT III					Total hours : 9			
Fourier series solution for one dimensional heat flow equation – Fourier series solutions for two dimensional heat flow equations under steady state condition – (Cartesian and Polar forms).								
UNIT IV					Total hours : 9			
Curve fitting by the method of least squares – fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large samples test for single proportions, differences of proportions, single mean, difference of means and standard deviations.								
UNIT V					Total hours : 9			
Small samples – Test for single mean, difference of means and correlations of coefficients, test for ratio of variances – Chi-square test for goodness of fit and independence of attributes.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Out come		On successful completion of the module students will be able to: 1. Understand the different types of PDE and will be able to solve problems occurring in the area of engineering and technology. 2. Know sampling theory and apply to solve practical problems in engineering and technology.						
Text Books:								
1. Venkataraman M. K, “Engineering Mathematics, Third year Part A & B”, 12 <sup>th</sup> Edition, The National Publishing Company, Madras 1996.								
2. S. C. Gupta and V. K. Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand and sons, 1975.								
Reference Books:								
1. Kandasamy P. et al, Engineering Mathematics, Vol. II & III, S. Chand & Co., New Delhi, 2012.								
2. Grewal B.S., Higher Engineering Mathematics, 40th Edition, Khanna Publishers, Delhi 2007.								
3. Bali N.P., Manish Goyal, “ Engineering Mathematics, 7 <sup>th</sup> Edition, Laxmi Publications, 2007.								
4. Erwin Kreyszig, Advanced Engineering Mathematics, 7 <sup>th</sup> Edition, Wiley India, 2007.								
5. Ray Wylie C. , Advanced Engineering Mathematics, 6 <sup>th</sup> Edition, Tata McGraw Hill, 2003								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T42	CONCRETE TECHNOLOGY	4	0	0	4	25	75	100
Objective (s)	1. Should be able to understand the Engineering properties of materials, Cement, Aggregates, Admixtures 2. Understand the hydration mechanism of Cement & properties of fresh and Hardened concrete 3. To design concrete mixes.							
UNIT – I	Cement				Total Hours : 12			
Portland cement- chemical composition- hydration of Portland cement- heat of hydration- Test on Cement - hardening of cement paste- Types of Portland cement- special hydraulics cements.								
UNIT – II	Aggregates & Fresh Concrete				Total Hours : 12			
Aggregates- natural and mineral aggregates- characteristics of aggregate and their significant- testing of aggregates- admixture for concrete- concrete at early ages- Workability of concrete- early Volume changes- setting time.								
UNIT – III	Hardened Concrete				Total Hours : 12			
Concrete- introduction- components of concrete- types- properties of hardened concrete and their significance, structure of the hardened concrete- Compressive strength of concrete and factors affecting it- elastic behaviour of concrete- drying shrinkage and creep.								
UNIT – IV	Durability Properties				Total Hours : 12			
Durability of concrete- significant- causes of concrete deterioration- alkali-aggregate reaction- deterioration by chemical actions- concrete in marine environment.								
UNIT – V	Mix Design				Total Hours : 12			
Concept of proportioning concrete mixes- mix design- IS code method- ACI method. Testing evaluation and control of concrete quality.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome	Student should be able to understand the properties of concrete and to design the concrete mixes of various grades used in the construction							
Text Books								
1. Santhakumar.Ar, Concrete Technology, Oxford University Press, 2013 2. Shetty,M.S, Concrete Technology; Theory & Practice, S.Chand& Group, New Delhi, 2014.								
Reference Books								
1. Gambhir.M.I, Concrete Technology: Theory & Practice, Tata McGraw Hill Co., New Delhi,2013. 2. Gupta. Yp, Concrete Technology & Good Construction Practices, New Age International (p)Ltd., 2013. 3. Neville.Am.& Brooksji.,Concrete Technology, Pearson Education Ltd., 2013. 4. Krishna Raju.N, Design of Concrete Mixes, CBS Publishers, New Delhi, 2013.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T43	ENVIRONMENTAL ENGINEERING- I	4	0	0	4	25	75	100
Objective (s)	1.To study the water supply demand and distribution 2.To understand the quality of water from various sources 3.To carryout functional design of water treatment units.							
UNIT – I	Introduction					Total Hours : 12		
Water supply Scheme - objectives and requirements - Domestic, industrial, commercial and public requirements - Various methods of estimating population - Variations in rate of demand and its effects on design.								
UNIT – II	Sources of Water and intakes:					Total Hours : 12		
Surface and groundwater sources - Computation of storage capacity of reservoirs by analytical and graphical methods - Forms of underground sources like wells, Infiltration wells and galleries, Intake structures, tube wells - Sanitary protection of wells-transportation of water- Pipe flow formulae – pipe materials- laying of pipes-testing of pipes-								
UNIT – III	Quality of Water:					Total Hours : 12		
Indian and W.H.O. Standards for drinking water - impurities in water - Physical, chemical and bacteriological analysis of water - quality of water for trade purpose and swimming pools								
UNIT – IV	Water Treatment system:					Total Hours : 12		
Unit process of water treatment - Principles, functions and design of flocculators, sedimentation tanks, sand filters, principles of disinfection, water softening, aeration, Iron and manganese removal.								
UNIT – V	Distribution System					Total Hours : 12		
Service reservoir location, determination of capacity – Method of distribution - Layout of distribution systems- Design of distribution system, analysis of pipe networks by different methods, pipe appurtenance for distribution system – Plumbing works and layout of water supply system for buildings, waste detection and prevention, Effects of corrosion and its prevention.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		An ability to apply knowledge of Environmental Science and Engineering to solve problems related to water supply and sanitation						
Text Books								
1.Duggal, K.N., Elements of Environmental Engineering, S. Chand & Company , New Delhi 2013 2. Punmia.B.C., Ashok K Jain and Arun K Jain., Water Supply Engineering: Environmental Engineering 1, Laksmi Publications (P) Ltd., 2013								
Reference Books								
1. Peavy.H, Rowe.D, and Tchobanoglous, G., Environmental Engineering, Tata McGraw-Hill, 2013 2. Venugopala Rao.P,Text book of Environmental Engineering, Prentice-hall of India Pvt Ltd., 2012 3. Santosh Kumar Garg, Water Supply Engineering: Environmental Engineering 1, Khanna Publishers, 2013 4. Modi, P.N, Water Supply Engineering: Environmental Engineering 1, Standard Publishers, 2011								



Department :Civil Engineering				Programme: B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T44	<b>MECHANICS OF SOLIDS-II</b>	3	1	0	4	25	75	100
<b>Objective (s)</b>	1. Calculate & understand the concept of determination of deflection of beams & trusses 2. Calculate the stresses due to unsymmetrical loading 3. The student is to realize the three-dimensional nature of stress and strain and the relationships between strain and displacement. 4. To understand the concept of various theories of failure							
<b>UNIT-I</b>	<b>Deflection of beams</b>				Total Hours:9			
Deflection of beams – Double Integration method - Macaulay’s method, moment area method -conjugate								
<b>UNIT- II</b>	<b>Energy methods</b>				Total Hours :9			
Strain energy due to axial, bending, shear and torsional forces – Impact loads. Principle of virtual displacement – principle of minimum potential energy –Castigliano’s Theorems – Maxwell – Betti’s theorem.								
<b>UNIT-III</b>	<b>Deflection of trusses</b>				Total Hours:9			
Deflection of trusses and frames – strain energy and dummy/unit load methods.								
<b>UNIT-IV</b>	<b>Analysis of continuous beams&amp; unsymmetrical bending</b>				Total Hours:9			
Analysis of continuous beams using generalized theorem of three moments – shear force and bending moment diagrams. Unsymmetrical bending – principal moments of inertia – stresses due to unsymmetrical bending.								
<b>UNIT-V</b>	<b>Complex strain &amp; Theories of failure</b>				Total Hours:9			
Complex strains – linear strains for tri-axial state of stress – principle strains in terms of stress – Mohr’s strain circle – relationship between Mohr’s strain and stress circles. Theories of failure – Brittle and Ductile materials.								
Total Contact Hours : 45		Total Tutorials:15		Total Practical Class : 0		Total Hours:60		
<b>Programme Outcome</b>		1. Relate loading and deformation states to the proper components of stress and Strain 2. Determine the deflection of beams & trusses 3. Relate complex stress & strain 4. Apply knowledge of theories of failure for design.						
<b>TextBooks</b>								
1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, 2012. 2. Bhavikatti. S. S., Structural Analysis – I, Vikas Publishing House (P) Ltd., New Delhi, 2012.								
<b>Reference Books</b>								
1. Shah.H.J. and Junnarkar.S.B., Mechanics of structures- Vol.I & Vol.II, Charotar Publishing house, Ltd, 2012. 2. Rattan, S.S., Strength of Materials, Tata McGraw-Hill, 2011.Ramasamy.V, Purushothama Raj.P, Strength of Materials, Pearson Education Ltd., 2012. 3. Jindal.Uc., Strength of Materials, Pearson Education Ltd.,2012 4. Negi.L.S., Strength of Materials, Tata McGraw-Hill, 2012								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T45	<b>HYDRAULICS AND HYDRAULIC MACHINERY</b>	3	1	0	4	25	75	100
<b>Objective (s)</b>	1. To have a thorough understanding of open channel flow. 2. To understand the basic principles in the working and application of typical pumps and turbines.							
<b>UNIT – I</b>					Total Hours : 9			
Open Channel flow: Types of channel, Velocity distribution, Chezy, Manning and Basin formulae, for uniform flow, Most economical section, critical flow, specific energy, specific force. Computation of uniform flow and critical flow.								
<b>UNIT – II</b>					Total Hours : 9			
Open channel flow: Non-uniform flow, Dynamic equation for Gradually Varied flow, computation for length of backwater curve, Rapidly varied flow- hydraulic jump, types, uses. Surges in open channels.								
<b>UNIT – III</b>					Total Hours : 9			
Basics of Turbo machinery: Impulse momentum equation, Hydrodynamics forces of jets on vanes, Velocity Triangles, Angular momentum principle, application to radial flow turbines.								
<b>UNIT – IV</b>					Total Hours : 9			
Turbines: Classification, impulse and reaction turbines, characteristic curves, draft tubes, governing of turbines, specific speed, unit quantities concept, similarity, cavitation.								
<b>UNIT – V</b>					Total Hours : 9			
Pumps: Centrifugal pumps- classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, cavitation in pumps. Reciprocating pumps- types, effects of acceleration and frictional resistance, separation, Air Vessels, work saved by fitting air vessels.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
<b>Programme Outcome</b>	1. At the end of the course, the student should be able to compute the various parameters of channels like uniform flow, critical flow and use it for typical practical situations. 2. Further the student should be able to select the type of pumps, turbines for given practical situations, apart from understanding their typical characteristics.							
<b>Text Books</b>								
1. Modi,P.N.,and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book House, New Delhi, 2014. 2. Rajput,R.K., Text Book of fluid Mechanics and Hydraulic Machinery, S.Chand & Company, (P)Ltd., New Delhi, 2014.								
<b>Reference Books</b>								
1. Gupta.S.C, Fluid Mechanics & Hydraulic Machines, Pearson Education Ltd., 2013. 2. Bansal,R.K., Text Book of fluid Mechanics and Hydraulic Machines, Lakshmi Publications(P)Ltd., 2013. 3. Subramanya.K., Fluid Mechanics & Hydraulic Machines-Problems & Solutions, Tata McGraw-hill, 2013. 4. Khurmi,R.S., A Text book of Hydraulics Fluid Mechanics & Hydraulic Machines, S.Chand & Company, 2014								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering						
Semester IV										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
CE T46	SURVEYING - II			3	1	0	4	25	75	100
Objective (s)	1. Solve sight specific problems such as determination of elevation by trigonometric and tacheometric means of surveying .									
	2. Understand the concepts of setting out curves in the field by both angular and linear method of surveying.									
	3. Learn the working principles of electronic distance measuring instrument and handling of total station.									
	4. Understand the concepts of geographical information systems and the utilization of global positioning systems which will be very much useful for students project works which involves measurements.									
UNIT – I	Control Surveying						Total Hours : 9			
Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals -Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre -Trigonometriclevelling - Single and reciprocal observations - Modern trends – Bench marking										
UNIT – II	Engineering Survey						Total Hours : 9			
Setting out curves: Horizontal curves – Elements of a circular curve and notations –Designation of a curve – Setting out a simple circular curve – Compound curve – Reverse curve – Transition – vertical curve.										
UNIT – III	Survey Adjustments						Total Hours : 9			
Errors - Sources, precautions and corrections - Classification of errors - True and most probablevalues - weighted observations - Method of equal shifts - Principle of least squares – Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks										
UNIT – IV	Advances in Surveying						Total Hours : 9			
Electro-optical system, Measuring Principle, Working Principle, Sources of error, Total station, Microwave system Measuring and working principle, Sources of error, GPS – Fundamentals – Introduction space, Control segments – Observation principle, Orbit Representation										
UNIT – V	Remote Sensing and GIS						Total Hours : 9			
Introduction of Remote Sensing - Electro Magnetic Spectrum - Types of Platforms – different types of aircrafts-Manned and Unmanned spacecrafts –sun synchronous and geo synchronous satellites – Types and characteristics of different platforms- Basic principles of data processing – GIS - Definition – Components of GIS – Data : Spatial and Non-spatial – Spatial Data- Data model input – Data analysis output .										
Total Contact Hours : 45			Total Tutorials : 15			Total Practical Class : 0		Total Hours : 60		
Programme Outcome		At the end of the course the student will posses knowledge about Tachometric surveying, Control surveying, Survey adjustments, Photogrametry and understanding the concept of EDM , Remote sensing and GIS								
Text Books										
1. Punmia .B.C . , et .al..” Surveying “, Vols, I &II, Laxmi Publications, 2012										
2. Kanetkar, T.P. ,Surveying and leveling, Vols. I & II, United book corporation, Pune,2012										
Reference Books										

1. Kanetkar, T.P. and Kulkarni,S.V., Surveying and Levelling, Part I & Part II , United book Corporation, Pune. 2012.
2. Shahani, P.B., Text book of Surveying, Vol.I& II, Oxford &IBH Publications, 2012.
3. Lillesand,T.M., Kiefer R.W., Remote sensing and Image Interpretation, John Wiley and Sons, Inc, New York,2010.
4. Paul.R. Wolf, Elements of Photogrammetric with air photo interpretation, Tata McGraw –hill, 2012.

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CEP41	SURVEYING LABORATORY - II	0	0	3	2	50	50	100
Objective (s)	1. To train the students in handling angular measuring instruments used for surveying. 2. To make the students in determining the elevation of an objective by various means of surveying associated with vertical and horizontal control							
List of Experiments								
1. Closed traverse, plotting and adjustment using Electronic theodolite 2. Open traverse, plotting and adjustment using Electronic theodolite 3. Determination of Heights and Distances by trigonometric surveying using electronic theodolite 4. Setting out for building using Electronic theodolite 5. Setting out curves by Rankine’s method using Electronic theodolite 6. Realignment of road curves 7. Total Station Surveying – Measurements of Distances and angles, Slope distances, Height, Traversing, setting out, etc 8. GPS Surveying – Co-ordinate Measurements								
(B) List of Demonstration Only								
1. Interpretation of Aerial Photographs- Demonstration								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 45	
Programme Outcome		To provide hands on exercise and make the students to learn the concept of determining the elevation of an objective by various means of horizontal as well as vertical control survey						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering					
Semester IV									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	UE	Total	
CE P42	<b>FLUID MECHANICS AND MACHINES LAB</b>	0	0	3	2	50	50	100	
<b>Objective (s)</b>	To determine the various parameters used in Fluid mechanics and Fluid Machinery								
<b>A. Fluid Flow Laboratory</b> 1. Calibration of rectangular, triangular, trapezoidal notches 2. Determination of coefficient of discharge for orifices and mouthpieces 3. Calibration of venturimeters, orifice meters and Rota Meters 4. Verification of Bernoullis theorem 5. Determination of pipe friction 6. Determination of minor losses in pipe due to bends, elbows, sudden contraction, expansion etc., 7. Determination of Metacentric height of various ship models 8. Determination of force due to Impact of jet on vanes									
<b>B. Fluid Machinery Laboratory</b> 1. Study of performance characteristics of centrifugal pump (constant speed) 2. Study of performance characteristics of Reciprocating pump 3. Study of performance characteristics of Submersible pump 4. Tests on Turbine									
Total Contact Hours :		Total Tutorials : 0		Total Practical Class : 45			Total Hours :45		
<b>Programme Out come</b>		(i) Students are able to measure the discharge through the channels and pipes, check fly stability of the floating bodies. (ii) To design the various pumps and Turbines used in the power stations.							

Department : Civil Engineering				Programme: B.Tech. Civil Engineering				
Semester IV								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CEP43	GEO SCIENCE ENGINEERING LAB	0	0	3	2	50	50	100
Objective (s)	1. To familiarize the various types of minerals and rocks, their geological characteristics to understand their behavior/performance. 2. To impart hands on training in determination of properties of rocks. 3. To provide the knowledge on interpretation of data to arrive the solution.							
1. Megascopic study of important rock forming/silicate minerals. 2. Megascopic study of important non-silicate minerals. 5. Megascopic study of important igneous rocks. 4 Megascopic study of important sedimentary rocks 5 Megascopic study of important metamorphic rocks 6 Elementary problems of true dip, apparent dip and strike of geological formations. 7 Establishing thickness, depth and structure of geological formations 8 Construction of topographic profile , geological sections and their interpretation 9 Electrical resistivity method (not recommended for examination). 10 Determination of soundness of rocks ( not recommended for examination 11 Determination of weathering of rock 12 Determination of durability of rock								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 45		
Programme Outcome		Student should able to identify minerals/rocks, their characteristics and their bearing on the construction. Also, the student will be familiar with attitude of geological formations and preparation of geological sections to address the problems during site investigation process.						

### SP P44 PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The activities will include games and sports / extension lectures.
2. Two Hrs. / Week will be allocated for physical education in the third and fourth semesters. The student participation shall be for a minimum period of 45 hours in both the semesters put together.
3. These activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, and performance. If a candidate Fails, he/she has to repeat the course in the subsequent years
5. Pass in this course is mandatory for the award of degree.

## V SEMESTER

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T51	DESIGN OF RCC STRUCTURES	3	1	0	4	25	75	100
Objective (s)	1.To understand design principles of reinforced concrete 2.To gain knowledge in the Limit state method of design of basic structural elements							
UNIT – I	Introduction and Design Philosophy				Total Hours : 9			
Introduction to Reinforced concrete structures- basic material properties-behaviour of concrete under uniaxial compression and tension-reinforcing steel- Design philosophy – Introduction to WSM,ULM,LSM-behaviour in flexure – Design for limit State Method: Concepts- Assumptions- Characteristic Strength and Load, Partial Safety Factors- Limit States- Limit State of Collapse in Flexure								
UNIT – II	Limit State Design of Beams and Slabs				Total Hours : 9			
Limit State of Collapse in Shear, Bond and Torsion- Design of beams and one way slab for flexure - Design of beams for flexure, shear, bond and torsion. Design of two way continuous slab systems. Design of Lintel Beams.								
UNIT – III	Limit State Design of Columns				Total Hours : 9			
Design of compression members – Effective length – Design short column under axial compression, axial compression with uniaxial bending, axial compression with biaxial bending, Design of slender columns – Braced slender column- un-braced slender column – Strength reduction coefficient method – additional moment method								
UNIT – IV	Limit State Design of Footings and Staircases				Total Hours : 9			
Design of footings – isolated footings with axial eccentric loading- combined rectangular footing – design of staircases- Introduction to fire resistant design – code provisions.								
UNIT – V	Design of Brick Masonry Walls				Total Hours : 9			
Design of brick masonry – strength of bricks – country-wire cut-hollow block-porotherm , aerocon bricks – code provisions – Specification for mortar, Design of Axially loaded walls, eccentrically loaded walls, Retaining walls.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Out come		1. An ability to design reinforced concrete members such as beams, columns, slabs, footings, staircases etc., by Limit state method of design. 2. An ability to design masonry walls as per IS 1905.						
Text Books								
1. Subramanian.N., Design of Reinforced Concrete Structures, Oxford University Press, 2013 2. Varghese.P.C, Limit State Design of Reinforced Concrete, Prentice-hall of India (p) Ltd.,2013								
Reference Books								
1. Arun Kumar Jain , Ashok Kumar Jain, Punmia.B.C, Limit state design of Reinforced Concrete, Lakshmi Publications (P) Ltd., New Delhi, First Edition, 2012 2. Ashok K. Jain, ‘Reinforced Concrete Limit State Design’, Nem Chand & Bros, 2012 3. Virendra Gehlot, Ram Chandra, Limit State Design of Concrete Structures, Standard Publishers, 2010. 4. Unnikrishna Pillai.S, Devdas Menon, Reinforced Concrete Design, Tata Mc Graw-hill, 2013.								



Department : Civil Engineering				Programme: B.Tech. Civil Engineering				
Semester V								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T52	STRUCTURAL ANALYSIS - I	3	1	0	4	25	75	100
Objectives	1. To develop an understanding of the static and kinematic indeterminacy of structures 2. To familiarize the students with various force and displacement methods of analysis 3. To analyse indeterminate structures with indirect/secondary stresses							
UNIT -I	Introduction				Total Hours : 9			
Types of structures – Behaviour of different structures- Static and kinematic indeterminacies – Analysis of statically indeterminate beams by consistent deformation/force method.								
UNIT -II	Analysis of Trusses				Total Hours : 9			
Analysis of plane trusses with one or two redundant members by force method - trusses with lack of fit - Thermal stresses.								
UNIT -III	Slope Deflection Method				Total Hours : 9			
Continuous beams and rigid frames, (with and without sway) - Symmetry and anti-symmetry- gable frames - Support settlement.								
UNIT -IV	Moment Distribution Method				Total Hours : 9			
Stiffness and carry over factors – Analysis of continuous Beams with and without support settlement - Plane rigid frames with and without sway								
UNIT -V	Miscellaneous Methods				Total Hours : 9			
Kani's method of analysis of beams and frames. Analysis of frames for lateral loads by portal and cantilever methods.								
Total Contact Hours: 45		Total Tutorials : 15		Total Practical Classes: 0		Total Hours : 60		
Programme Outcome		Student should able to identify the static and kinematic indeterminacy and analyse them by applying suitable force/ displacement method.						
Text Books								
1. Devdas Menon, Structural Analysis, Narosa Publishing House, 2014 2. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vol. II, Laxmi Publications, New Delhi, 2004.								
Reference Books								
1. Wang. C. K., Intermediate Structural Analysis, Tata Mc Graw Hill, 2013 2. Russell C Hibbeler, Structural Analysis, Pearson Education Ltd., 2013 3. Khurmi. R.S., Theory of Structures, S.Chand & Company ,2012. 4. Bhavikatti. S. S., Structural Analysis, Vol. I, Vikas Publishing House (P) Ltd., 2012.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T53	<b>GEOTECHNICAL ENGINEERING - I</b>	3	1	0	4	25	75	100
<b>Objective (s)</b>	1. Provide the description of soil and to characterise soil as per IS Code. 2. To develop an understanding of the soil hydraulics, principles of stress distribution due to self-weight and applied loading conditions and its application to compressibility of soil. 3. Familiarize the students an understanding of strength of soils.							
<b>UNIT – I</b>	<b>Index Properties</b>				Total Hours : 9			
Soil formation – soil minerals – soil structure - three phase system – definitions- inter- relationships (derivations and problems) – Index properties determinations - IS soil classification – sol deposits in India.								
<b>UNIT – II</b>	<b>Soil Hydraulics</b>				Total Hours : 9			
soil water – capillary phenomenon – permeability – field and laboratory test - seepage and flow nets – geostatic stress - neutral and effective stress (problems).								
<b>UNIT – III</b>	<b>Stress Analysis</b>				Total Hours : 9			
Stress due to concentrated load, due to uniformly loaded area, line load strip load- pressure distribution diagrams - contact stress - Westergarrd’s analysis.(Derivations and problems)								
<b>UNIT – IV</b>	<b>Soil Compressibility</b>				Total Hours : 9			
Compressibility : One dimension consolidation - consolidation process - consolidation theory – laboratory test – pre consolidation pressure. Compaction – laboratory tests – field compaction (problems)								
<b>UNIT – V</b>	<b>Shear Strength</b>				Total Hours : 9			
Shear strength- Mohr – coulomb theory – shear strength parameter – laboratory and field tests – pore pressure parameters - stress path - insitu shear strength - factors affecting shear strength - shearing characteristics of sand and clay (problems).								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		The student should be able to classify the soil and evaluate the geotechnical properties of soil used in the design of geotechnical structure.						
<b>Text Books</b>								
1. Purushothama Raj. P, Soil Mechanics and Foundation Engineering, Pearson Education, 2010 2. Ashok Kumar Jain, Punmia, B.C., Soil Mechanics and foundations, Lakshmi Publications ,2013.								
<b>Reference Books</b>								
1. Braja M. Das Textbook of Geotechnical Engineering, Cengage Learning, 2009 2. Venkataramiah. C., Geo Technical Engineering, NAIP, 2012. 3. Murthy. V.N.S., A Text Book of Soil Mechanics & Foundation Engineering, CBS publishers, 2013 4. Venkatramaiah.C, Geotechnical Engineering, New Age International (p) Ltd., 2014.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T54	ENVIRONMENTAL ENGINEERING II	4	0	0	4	25	75	100
Objectives	1.To study the important aspects of sanitation 2.To understand the sewerage system and functional design of sewage treatment units. 3.To learn about the safe disposal of waste water							
UNIT – I	Introduction				Total Hours : 12			
Definitions - General considerations- Interdependence of water supply and waste water disposal – source and nature of waste water - Combined and separate system – surface drainage - storm water flow – Investigation and design of sewerage schemes – Data collection - Design flow for separate, storm and combined systems.								
UNIT – II	Microbiology of sewage				Total Hours : 12			
Sewage Characteristics- Physical, chemical and biological characteristics of sewage – Chemical Analysis - D.O. and B.O.D. and its significance. Sampling, population equivalent-Significance of industrial wastes.								
UNIT – III	Collection and transport of sewage				Total Hours : 12			
Collection and Transport of sewage - Materials for sewers — Flow formulae - Self cleansing of sewers - Full and partial flow conditions - Sewer sections. Design of separate sewers - Storm drains and combined sewer systems.- Design principles and procedures, sewer construction: Sewer laying under various conditions,— Tests for sewers. Flushing equipment for removal of sand, grit – Sewer appurtenances - Manholes - Inlets - catch basins - Sand, grease and oil traps. Sewage pumps – Necessity of pumping and classification of pumps - Sanitary fixtures and fittings - General layout and street connection - Principles of design of anti syphonage device -Types - Inspection chamber - Fresh air inlet.								
UNIT – IV	Treatment methods				Total Hours : 12			
Primary treatment : Basic principles of sewage treatment - Screens, Grit chamber - Principles of sedimentation - Design of settling tanks - Types of settling tanks - Chemical precipitation. Biological Treatment and unit Process : Contact beds - Trickling filter - Description and operation of low rate and high rate filters, intermittent sand filter - Design of the above filters. Activated sludge Process: Theory – Diffuser and Mechanical aeration - Conventional, High rate and extended aeration process - Process modification – Oxidation ditch - Principles and design of waste stabilization lagoon - aerated Lagoon. Principle of Sludge digestion - Optimum conditions - Digestion tanks -Supernatant liquid - Sludge gas - Drying beds. Septic and Imhoff tanks								
UNIT – V	Disposal of sewage				Total Hours : 12			
Wastewater Disposal and Reuse - Disposal of sewage - Land disposal - Discharge in to rivers. lakes, estuaries and ocean – River pollution - Oxygen sag curve - recycle and reuse of waste effluents. – Disinfection – Chlorination and odour prevention. Introduction to Low cost treatment methods -Special nature of problem of industrial water - Process modifications and by product recovery								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Out come		An ability to use the techniques, skills, and modern engineering practices to solve problems related to Domestic and Industrial Waste Water management and Disposal.						
Text Books								
1.Duggal, K.N., Elements of Environmental Engineering ,S. Chand & Company , New Delhi 2013 2. Punmia.B.C., Ashok Jain and Arun Jain., Waste Water Engineering including Air Pollution, Laksmi Publications (P) Ltd., 2013								
Reference Books								
1. Peavy.H, Rowe.D, and Tchobanoglous, G., Environmental Engineering, Tata McGraw-Hill, 2013 2. Mackenzie I Davis, Water & Wastewater Engineering, Tata Mc Graw-Hill, 2013 3. Modi. Pn., Sewage Treatment & Disposal & Wastewater Engineering Vol.2, Standard Book House, 2013.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering					
Semester V									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	UE	Total	
CE T55	TRANSPORTATION ENGINEERING - I	3	1	0	4	25	75	100	
Objective (s)	The student should have understood the various aspects of Highway Engineering including material characterization, pavement design and management								
UNIT – I	Highway Geometry				Total Hours : 9				
Importance Road transportation, Highway alignment – Requirement, Engineering surveys for highway location. Maps & drawings to be prepared. Geometric design – Cross section element, width, camber, design – speed, sight distances, requirements and design of horizontal and vertical alignments.									
UNIT – II	Highway Materials				Total Hours : 9				
Highway materials – Properties of sub-grade pavement component materials – Tests on aggregates, sub- grade soil & bituminous materials. Design of Bituminous mixes as per M52									
UNIT – III	Flexible Pavements				Total Hours : 9				
Pavement analysis – flexible pavement – calculation of stresses – single layer, two layer theory – Computation of strain at the layers interface – computation of deflection. Rigid pavement - calculation of stresses – load and temperature effects - Westergaard’s theory - Bradbury theory.									
UNIT – IV	Rigid Pavements				Total Hours : 9				
. Pavement Design Factors in the design of flexible and rigid pavements, CBR methods. IRC recommendations on flexible pavement design (IRC37) and Rigid pavement (IRC58). Design of Surface and subsurface highway drainage.									
UNIT – V	Construction and Maintenance				Total Hours : 9				
Pavement construction techniques – Types of pavements – WBM, WMM , GSB construction. Construction of bituminous pavements and rigid pavements. Pavement failures and their remedies. Pavement evaluation – structural, functional.									
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60			
Programme Outcome		Student will be familiarized with the terminology and fundamental concepts of Highway Engineering.							
Text Books									
1. Veeraragavan.A, Khanna. S.K. , Ceg Justo, Highway Engineering, Nem Chand & Brothers, 2014 2. Sharma, S.K. “ Principles Practice and Design of Highway Engineering ”, S. Chand & Co Ltd, 2013									
Reference Books									
1. Gupta B.L and Amith Gupta, Highway and Bridge Engg., Standard publishers, and Distributor, 2010. 2. Partha Chakroborthy and Animesh Das, Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd., 2013. 3. Lr Kadiyali, Lr Kadyali, Nb Lal ,“ Principles and practice of highway engineering ”, Khanna Publishers. 2013 4. Rangwala.S.C, Highway Engineering, Charotar Book Distributors, 2013									

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P51	<b>GEOTECHNICAL ENGINEERING LABORATORY</b>	0	0	3	2	50	50	100
<b>Objective (s)</b>	1. To provide the hands on training in determination of Index and Engineering and index properties of soils. 2. To familiarize the students to do the experiments as per the guidelines of BIS. 3. To provide the knowledge on interpretation experimental results to solve foundation problems.							
	1. Specific Gravity of CG and FG Soils 2. In-situ unit weight Determination – Core Cutter Method & Water content Determination 3. Grain Size Analysis – Mechanical Method - Dry Sieve Analysis / Wet Sieve Analysis 4. Grain Size Analysis – Sedimentation Analysis - Hydrometer Method 5. Atterberg Limits: Liquid Limit Test and Plastic Limit Test 6. Atterberg Limit: Shrinkage Limit Test & Free Swell Test 7. Laboratory Permeability Test: Constant and Variable Head 8. Standard Proctor Compaction Test 9. Direct Shear Test 10. Unconfined Compression Test 11. Triaxial Shear test – UU Test 12. Visual Soil Identification as per IS Code 13. Consolidation Test (Demo)							
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 45	
<b>Programme Outcome</b>		Student should able to conduct suitable experiment on soil to evaluate the index properties to classify the soil and to evaluate other geotechnical properties of soil used in design of geotechnical structures.						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P52	<b>ENVIRONMENTAL ENGINEERING LAB</b>	0	0	3	2	50	50	100
Objective (s)	1. To learn and practice on the various testing methods for water quality, waste water quality and other environmental parameters. 2. To correlate theoretical and practical and measures for visual understanding and practice							
1. Determination of Turbidity, pH, Conductivity and Residual Chlorine. 2. Determination of Alkalinity. 3. Determination of Chlorides. 4. Determination of Hardness. 5. Determination of Iron 6. Determination of Manganese. 7. Determination of Fluorides. 8. Determination of Total Solids. 9. Determination of Suspended solids. 10. Determination of Dissolved Oxygen. 11. Jar test for the determination of optimum coagulant Dose. 12. Determination of B.O.D. 13. Determination of C.O.D. 14. Estimation of E-Coli. 15. Plate count (for bacterial analysis of water) 16. Determination of Residual Chlorine								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 45		
Programme Out come		Students should capable of learning and conducting experiments on water, waste water and other environmental pollution and their by accessing them self on the process decision making with the help of suitable national and international coddle provision						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P53	MATERIAL TESTING LABORATORY-II	0	0	3	2	50	50	100
Objective (s)	1. This course provides an understanding of the basic properties of construction materials, and presents laboratory standards and testing requirements for these materials. 2. To familiarize the students to do the experiments as per the guidelines of BIS. 3. To provide the knowledge on mix proportioning of concrete as per the guidelines of BIS. 4. To obtain practical knowledge about fresh and hardened properties of concrete 5. Develop skills for analyzing experimental data and working in teams. 6. Develop skills for analyzing experimental data and working in teams.							
I. Tests on cement								
1. Determination of specific gravity of cement. 2. Determination of standard consistency of cement paste. 3. Determination of initial and final setting times of cement. 4. Determination of soundness of cement. 5. Determination of compressive strength of cement mortar.								
II. Tests on aggregates								
6. Determination of specific gravity and water absorption of fine & coarse aggregate. 7. Sieve analysis of fine & coarse aggregates 8. Determination of maximum bulking and corresponding optimum moisture content of fine aggregate. 9. Determination of bulk density of fine and coarse aggregates.								
III. Tests on fresh concrete								
11. Determination of degree of workability: Slump cone test, compaction factor test, Vee Bee time test, flow table test								
IV. Test on hardened concrete, tiles & bricks								
12. Determination of Compressive strength of concrete 13. Determination of Flexural strength of concrete 14. Determination of Splitting tensile strength of concrete 15. Determination of water absorption and flexural strength of clay tiles. 16. Determination of water absorption and crushing strength of bricks.								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45			Total Hours : 45	
Programme Outcome		Student should able to conduct suitable experiment on construction materials to test their properties as per BIS and to conduct proper test to evaluate the properties of fresh and hardened concrete.						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester V								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
HS P54	<b>GENERAL PROFICIENCY -I</b>	0	0	3	2	100	-	100
<b>Objective (s)</b>	1. To hone the communication and non verba skis of the students 2. To improve their Listening, Speaking, Reading and writing skis of students 3. To help the students to get rid of the inhibitions and communicate with ease. 4.To enhance the employability prospects of students 5. To ensure the personality development of the students by sharpening their soft skills 6. To facilitate the students’ entry into industry by grooming them holistically							
<b>Unit -I</b>	<b>Art Of Communication</b>							
Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback								
<b>Unit - II :</b>	<b>Introduction To Soft Skills</b>							
Attitude – Self-Confidence – Leadership Qualities – Emotional Quotient – Effective Time Management Skills – Surviving Stress – Overcoming Failure – Professional Ethics – Interpersonal Skills								
<b>Unit – III</b>	<b>Writing</b>							
Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis								
<b>Unit – IV</b>	<b>Speaking Practice</b>							
Dialogue – Telephone Etiquette – Public Speaking – Debate – Informal Discussions – Presentations								
<b>Unit – V</b>	<b>Aptitude</b>							
Verbal and Numerical aptitude								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours :45		
<b>Programme Out come</b>		On successful completion of the module, the students will be able to : 1. Become good communicators, 2. Imbibe the requisite soft skills, 3. sharpen their writing skills, 4. Analyse contemporary issues from various perspectives						



## VI SEMESTER

Department : Civil Engineering				Programme: B.Tech. Civil Engineering				
Semester VI								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T61	STRUCTURAL ANALYSIS - II	3	1	0	4	25	75	100
Objectives	1. To develop an understanding of the rolling loads and influence lines in determinate and indeterminate beams 2. To familiarize the students with analysis of arches and cables 3. To introduce the concept of plastic analysis of structures							
UNIT -I	Arches and Cables				Total Hours : 9			
Theory of arches - Analysis of three hinged and two hinged arches - rib shortening, temperature effects. Analysis of forces in cables - Suspension bridges.								
UNIT -II	Influence lines for determinate structures				Total Hours : 9			
ILD for simply supported and cantilever- shear, moment and support reaction. Moving loads –single and several point loads – maximum bending moment and maximum shear force –absolute maximum bending moment - determination of equivalent UDL.								
UNIT -III	Influence lines for indeterminate structures				Total Hours : 9			
Influence lines – Müller-Breslau Theorem - principle and its application. Influence lines for continuous beams. Introduction to bridge floor system- ILD for truss reaction, member forces and determination of maximum forces								
UNIT -IV	Plastic Analysis				Total Hours : 9			
Plastic Theory – Yield stress - Load Factor – Plastic Hinge – Moment redistribution - Shape factor – Upper and lower bound theorems – plastic analysis of beams and frames.								
UNIT -V	Introduction to Matrix methods of Analysis				Total Hours : 9			
Stiffness and flexibility characteristics of structures- stiffness and flexibility matrices- properties of stiffness matrix- stiffness and flexibility matrix relationship- comparison of stiffness and flexibility methods.								
Total Contact Hours: 45		Total Tutorials : 15		Total Practical Classes: 0		Total Hours : 60		
Programme Outcome		Student should able to develop and apply influence lines in structural analysis. The students should also be able to appreciate plastic theory of analysis.						
Text Books								
1. Junnarkar. S.B.,Shah. H.J.,, “ Mechanics of structures” Vol. II. Charotar publishers. 2013. 2. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vol. II, Laxmi Publications (P) Ltd., 2012.								
Reference Books								
1. Wang. C. K., Intermediate Structural Analysis, Tata Mc Graw Hill, 2013 2. Russell C Hibbeler, Structural Analysis, Pearson Education Ltd., 2013 3. Khurmi. R.S., Theory of Structures, S.Chand & Company, 2012. 4. Devdas Menon, Advanced Structural Analysis, Narosa Publishing House, 2012.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering					
Semester VI									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	EA	Total	
CE T62	GEOTECHNICAL ENGINEERING - II	3	1	0	4	25	75	100	
Objective (s)	1. Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation. 2. Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution. procedures used for : a) bearing capacity estimation, b) Pile carrying capacity. 3. To familiarize the concepts of earth pressure, design Earth Retaining structures and to determine stability of slopes.								
UNIT – I	Soil Exploration					Total Hours : 9			
Introduction - need, planning, stages - depth and spacing of soil-exploration - methods of exploration – Samples - samplers, sampling method – Insitu tests – SPT, CPT, VST, pressuremeter - exploration reports.									
UNIT – II	Lateral earth pressure					Total Hours : 9			
Active, passive and earth pressure at rest, Rankine and Coulomb’s theory – Rebhann's Method. Earth pressure due to inclined back fill, line load and earth quake load - Cantilever sheet pile wall in granular and clay soil. (problems). Design of braced excavation (concept only).									
UNIT – III	Shallow foundation					Total Hours : 9			
Types and selection criteria – Shear failures - Bearing capacity Determination using Terzaghi and IS code formula (problems) – SBC from field tests - proportioning of foundation – BC of foundation subjected to moments and earthquake loading – Elastic and Consolidation settlement. Methods to increase BC (Concept only).									
UNIT – IV	Pile foundations					Total Hours : 9			
Introduction- classification-selection criteria- Individual carrying capacity- static and dynamic approach (problems) – lateral plié carrying capacity - pile group – group carrying capacity - pile load tests- - Under reamed piles-IS Codal provisions.									
UNIT – V	Stability of slopes					Total Hours : 9			
Introduction- slopes failure - stability of infinite slope – landslides. Finite slope analysis - Swedish circle method – stability number (problems) – Reinforced slopes.									
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60			
Programme Outcome		To develop an understanding of the behavior of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.							
Text Books									
1. Braja M. Das Principles of Foundation Engineering, Cengage\Delmar Learning India (P) Ltd., 2013. 2. Purushothama Raj. P, Soil Mechanics and Foundation Engineering, Pearson Education Ltd., 2010									
Reference Books									
1. Arora.Kr., Soil Mechanics & Foundation Engineering, Standard Publishers, 2012. 2. Varghese P.C. Foundation Engineering, Prentice-hall of India Pvt. Ltd, 2012. 3. Murthy. V.N.S., A Text Book of Soil Mechanics & Foundation Engineering, CBS publishers, 2013 4. Ashok Kumar Jain, Punmia, B.C., Soil Mechanics and foundations, Lakshmi Publications ,2013									

Department : Civil Engineering				Programme : B.Tech. Civil Engineering					
Semester VI									
Course Code	Course Name	Hours / Week			Credit	Maximum Marks			
		L	T	P	C	IA	UE	Total	
CE T63	<b>TRANSPORTATION ENGINEERING II</b>	3	1	0	4	25	75	100	
<b>Objective (s)</b>	1. Provide the students with a basic understanding of the railway and airport engineering. 2. Introduce to the students, the role of a Civil Engineer in the above modes of transport.								
<b>UNIT – I</b>					Total Hours : 9				
Permanent way – gauges, components of permanent way, rails; functions, requirements, types, failures, creep of rails; Sleepers - types, requirements; Ballast – functions requirements, track fittings and fastenings.									
<b>UNIT – II</b>					Total Hours : 9				
Geometric design of the track – gradients, grade compensation, speed, super-elevation, cant deficiency, negative cant transition curve Problems on geometric design..									
<b>UNIT – III</b>					Total Hours : 9				
Points and crossings – turn outs, switches, crossings, types of crossings, Design of turnouts; stations - site selection, requirements of a railway station, classification of stations; yards – types of yards,									
<b>UNIT – IV</b>					Total Hours : 9				
Airport planning – Aircraft characteristics –airport planning, obstructions, types of airport, Wind rose diagram, Runway orientation.									
<b>UNIT – V</b>					Total Hours : 9				
Basic runway length and corrections. Design of exit taxiway, Runway marking and lighting, LCN and PCN, airport drainage, Problems on LCN & PCN									
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0			Total Hours : 60		
<b>Programme Outcome</b>		The student should have learnt the basic definitions regarding Railway Engineering & Airport Engineering.							
Text Books									
1. Khanna S.K, Jain.S.S, Arora.M.G., Airport Planning and Design, Nem Chand and Bros., 2012 2. Saxena, S.C., S. Arora. S.P., Text Book of Railway Engineering, Dhanpat Rai Publications (P) Ltd., 2013.									
Reference Books									
1. Mundrey.J.S, Railway Track Engineering, Tata Mc Graw-hill, 2013. 2. Subhash C Saxena, Airport Engineering Planning & Design, CBS Publishers, 2012 3. Agarwal, M. M., Agarwal, M. M, Indian Railway track, Standard Publishers, 2008. 4. Kristi, Lal, Transportation Engineering, PHI, New Delhi, 2008.									

Department : Civil Engineering				Programme : B.TECH. Civil Engineering				
Semester VI								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P61	<b>TRANSPORTATION ENGINEERING LAB</b>	0	0	3	2	50	50	100
<b>Objective (s)</b>	1. To develop an understanding of the highway material. 2. Familiarize the students with various test procedures a per							
<b>Cycle – I</b>	<b>Tests on soil and granular material</b>							
Optimum water content of soil, CBR test on the soil, tests on the GSB and WMM								
<b>Cycle – II</b>	<b>Tests on Aggregate</b>							
Crushing value test, impact value test, Specific Gravity and water absorption test, flakiness and elongation test, angularity test,								
<b>Cycle – III</b>	<b>Tests on Bitumen</b>							
Penetration test, softening point test, ductility test, specific gravity test, flash point test, viscosity test.								
<b>Cycle – VI</b>	<b>Tests on Bituminous mixes</b>							
Testing of BM, SDBC of mixes, arriving at Optimum bituminous content.								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 45		
<b>Programme Out come</b>		The student should have learnt to characterize various highway materials						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VI								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P62	<b>ESTIMATION COSTING AND VALUATION LAB</b>	2	0	3	2	50	50	100
<b>Objective (s)</b>	1. To study the types of estimation 2. To study the analysis of rates and types of specification 3. To study the method of valuation							
<b>UNIT I</b>	<b>Introduction</b>							
Estimates – types of estimates – Advantages – Method of measurements – Unit of measurement for various item of work – Method of measurement as per IS 1200, method of estimation; Centre line method of estimation – Examples using above methods.								
<b>UNIT II</b>	<b>Estimation of buildings</b>							
Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, Color washing and painting for shops, single room & double room building and simple residential buildings with flat roof.								
<b>UNIT III</b>	<b>Estimation of other structures</b>							
Estimating of septic tank, soak pit – Sanitary and water supply installations – Water supply pipe line – Sewer line – Tube well – Open well – Estimate of bituminous and cement concrete roads – Various types of arches – Calculation of brick work and RCC works in arches - Estimate of retaining walls and box culvert.								
<b>UNIT IV</b>	<b>Specification and rate analysis</b>							
Specification: purpose and basic principles of general and detailed specification of various item of work – Earthwork excavation – Cement concrete – Damp proof course – Form work – Brick and stone masonry – Flooring- Painting of wood work. Analysis of rate – Purpose – Quantity of materials per unit rate of work – Requirement of labour and materials for different works – Obtaining the rate for different works using local schedule of rates – Cement mortar – Cement concrete – RCC- Brick masonry – Plastering – Flooring – Painting.								
<b>UNIT V</b>	<b>Valuation</b>							
Valuation – Purpose, definition of common terms used in valuation such as free and lease hold property – Gross income, net income, outgoings, sinking fund, scrap value, salvage value, market value, book value, capital cost and depreciation methods – Valuation of building using different methods with examples – Fixation of rent for a building - Valuation of land.								
Total Contact Hours : 30		Total Tutorials : 0		Total Practical Class : 45		Total Hours : 75		
<b>Programme Out come</b>		Based on PWD PSR & CPWD plinth area rates the student should be able to prepare the detailed estimate and valuation of given building.						

Department : Civil Engineering					Programme: B.Tech. Civil Engineering			
Semester VI								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P63	COMPUTER AIDED DESIGN LAB	0	0	3	2	50	50	100
Objectives	1. To gain basic knowledge in modelling of structures. 2. To familiarize and give hands on training to students using wok sheets and databases.							
1. Structural analysis and Design : Introduction to STAAD Pro V 8i – Preprocessor, creating geometry, editing tools, load and support definition and structuring of output file. Types of analysis, use of post processor and report generation. 2. Analysis of continuous beams- beams with different loads, internal hinges, elastic supports, support settlement and moving loads. 3. Analysis of trusses – lack of fit and temperature stresses, wind load generation, moving loads and industrial trusses. 4. Analysis of rigid jointed frames- different types of loads, inclined supports, elastic supports, support settlement, moving loads and moment envelop. 5. Special Topics- 3-D modelling tools, modelling of hybrid structure-imparting structure from library 6. Comparison with ETABS, STRUDS software (Demo only)								
Total Contact Hours: 0		Total Tutorials : 0		Total Practical Classes: 45		Total Hours : 45		
Programme Outcome		Student will able to model, analyse and design structures using structural analysis software.						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VI								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
HS P64	<b>GENERAL PROFICIENCY-II</b>	0	0	3	2	100	-	100
<b>Objective (s)</b>	1. To develop the students' critical thinking and analytical skills							
	2. To help the students to equip themselves with the necessary skill sets.							
	3. To improve the students' problem solving skills							
	4. To help the students to prepare for interviews and face them with confidence							
	5. To make the students industry-ready and employable							
	6. To enable the students to be more participative in Group Discussions and other activities.							
<b>Unit – I : Composition Analysis</b>								
Technical and Non-Technical Passages (GRE Based) – Differences in American and British English – Analyzing Contemporary issues – Expanding Terminology								
Unit – II : Writing								
Job Application Letter Writing – Resume Writing Unit –								
<b>III : Oral Skills</b>								
Group Discussion – Introduction and Practice – Team Work – Negotiation Skills – Organizing and Attending Meetings – Facing Interviews								
<b>Unit – IV : Adapting To Corporate Life</b>								
Corporate Etiquette – Grooming and Dressing								
<b>Unit – V : Aptitude</b> : Verbal and numerical aptitude								
Total Contact Hours :		Total Tutorials : 0		Total Practical Class :		Total Hours :		
<b>Programme Out come</b>		On successful completion of the module students will be able to: <ul style="list-style-type: none"><li>• Communicate better</li><li>• Confidently face the placement process</li></ul>						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE SC7	<b>SURVEY CAMP</b>	0	0	3	2	100	-	100
<b>Objective (s)</b>	1. Be able to apply the Knowledge gained during the Surveying courses I & II 2. Able to take decisions to tackle the site specific problems							
Reconnaissance, selection of main stations- measurement of horizontal and vertical angles- measurement of base line-determination of R.L. of main station by double leveling from B.M.- measurement of bearing of any one line- computation of coordinates of station points- plotting of details- interpolation of contours								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours :45		
<b>Programme Out come</b>		At the end of the Camp the students should be able to understand the practical implementation of theoretical knowledge gained in Surveying subject.						



## VII SEMESTER

Department : Civil Engineering				Programme : B.Tech. in Civil Engineering				
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P		C	IA	UE
CE T71	DESIGN OF STEEL STRUCTURES	3	1	0	4	25	75	100
Objective (s)		(1) To understand the principles of design philosophy (2) To understand the provisions in Codes and learn follow Codal practices						
UNIT – I		Introduction to limit state design				Total Hours : 9		
Design of tension members – single and compound sections – tension splices – design of lug angles. Failures in bolted and welded joints – design of joints with bolts and welding.								
UNIT – II		Compression Members				Total Hours : 9		
Design of axially and eccentrically loaded members, Built-up columns, Design of Lacings and Battens, Design of Column Splices. Design of column bases.								
UNIT – III		Design of flexural members				Total Hours : 9		
Laterally supported and unsupported members design of purlins.								
UNIT – IV		Design of built-up Beams				Total Hours : 9		
Design of gantry girders and plate girders.								
UNIT – V		Design of Eccentric Joints				Total Hours : 9		
Design of eccentric joints by bolting and welding – design of stiffened and unstiffened seated connections.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		At the end of the course the students would develop confidence and adequate capability in simple practical design.						
Text Books								
1. Shiyekar, M.R., Limit State Design in STRUCTURAL STEEL, Second Edition, PHI Learning Private Ltd., Delhi, 2013. 2. Shah, V.L., and Veena Gore, LIMIT STATE DESIGN OF STEEL STRUCTURES, Structures Publications, Pune, 2012.								
Reference Books								
1. Subramanian, P., Design of steel structures, Oxford Publishers, New Delhi, 2007 2. Bhavikatti, S.S., Design of Steel Structures, IK International Publishing House Pvt Ltd, New Delhi, 2014. 3. Sai Ram K.S., Design of Steel Structures, Pearson Education Ltd., 2013. 4. Virendra Gehlot, Ram Chandra, Design of steel structures, Vol.I & II, Standard Publishers, 2012.								

Department : Civil Engineering				Programme : B.TECH. Civil Engineering				
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T72	<b>HYDROLOGY AND WATER RESOURCES ENGINEERING</b>	4	0	0	4	25	75	100
<b>Objective (s)</b>	To understand the various physical processes in the hydrologic cycle and the methods of estimation thereof.							
<b>UNIT – I</b>	<b>Precipitation</b>					Total Hours : 12		
Hydrologic cycle, precipitation, stream flow, evaporation, transpiration and infiltration, types and measurement of precipitation, gauge networks, hyetographs, average depth of precipitation over the basin, mass rainfall curves, intensity duration curves – estimates of missing data and adjustment of records.								
<b>UNIT – II</b>	<b>Evapo-transpiration and Infiltration</b>					Total Hours : 12		
Evaporation, factors affecting, measurement and estimation of evaporation, transpiration, factors affecting and determination of transpiration, methods of estimating evapo-transpiration, factors affecting and measurement of infiltration, infiltration indices.								
<b>UNIT – III</b>	<b>Groundwater</b>					Total Hours : 9		
Occurrence and movement of ground water, Darcy’s law, aquifers – types and specific yield of aquifers and basin, steady & unsteady flow in wells in confined and unconfined aquifers, well loss and specific capacity of a well.								
<b>UNIT – IV</b>	<b>Runoff</b>					Total Hours : 12		
Factors affecting runoff, Hydrograph analysis – Unit hydrograph theory and analysis, Space distribution and variability of runoff, stream flow measurement – selection of site, velocity and discharge measurements – base flow separation methods. Probability Concepts : Rainfall frequency, Flood frequency, Stream flow synthesis – Elements of stochastic methods.								
<b>UNIT – V</b>	<b>Floods</b>					Total Hours : 12		
Design flood, estimation by empirical and statistical methods, Flood control Measures – Levees and flood walls, Flood control reservoirs, Water shed management, Flood forecasting methods, Flood routing (elementary treatment only). Planning for Water Resources Development: Level, phases, objectives, Project formulation, systems analysis, multipurpose projects.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		At the end of the course the student should be able to estimate the effective rainfall, flood magnitude etc and relate it to the filed situations.						
<b>Text Books</b>								
1. Santosh kumar Garg, Hydrology and Water Resources Engineering, Khanna Publishers, 2013. 2. Satyanarayana murthy.C., Water Resources Engineering Principles & Practice, New Age International (P) Ltd, 2014.								
<b>Reference Books</b>								
1. Subramanya.K, Engineering Hydrology, Tata McGraw-Hill, 2013. 2. Varshney, R.S., Engineering Hydroloy, Nem Chand & Bros., 2012. 3. Larry W Mays, Ven Te Chow, David R Maidment, Applied Hydrology, Tata McGraw-Hill, 2012. 4. Jayarami Reddi.P, Text Book of Hydrology, Lakshmi Publications, 2013.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P71	<b>DESIGN AND DRAWING (RCC &amp; STEEL)</b>	2	0	3	2	50	50	100
<b>Objective (s)</b>	1. To prepare working drawings for steel and concrete structures. 2. Preparation of layout of the structure with detailed design details. 3. Preparation of working drawings with all dimensions required for execution / fabrication of structures.							
<b>Detailed Design and Drawing of the following RCC elements/Structures:</b> 1. Continuous beams and slab systems. 2. Rectangular Combined footings. 3. Cantilever retaining walls 4. Elevated - circular and rectangular water tanks (excluding staging) 5. Staircases.								
<b>Detailed Design and Drawing of the following Steel elements/Structures:</b> 1. Roof trusses and joints including purlins . 2. Stiffened welded seat connections – moment resisting welded connections for beams. 3.Welded plate girder. 4. Gantry girder. 5. Self supporting chimney.								
Total Contact Hours : 30		Total Tutorials : 0		Total Practical Class : 45		Total Hours :75		
<b>Programme Out come</b>		An ability to design, draft and detail various concrete and steel structures / members.						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE CV7	COMPREHENSIVE VIVA VOCE	0	0	3	2	50	50	100
Objective (s)	To verify the overall knowledge that the student has gained during the course							
The student will be tested for his understanding of basic principles of the core Civil Engineering subjects. The internal assessment for a total of 50 marks will be made by an internal assessment committee. The committee will conduct two written examinations of objective or short questions type from the all the core subjects. The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 45		Total Hours :45		
Programme Out come		The students will be able to attend the various Competitive examinations such as GATE, IES examination etc.						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	iA	EA	Total
CE PW7	PROJECT PHASE - I	0	0	6	6	100	0	100
Objective (s)	The students are encouraged to get hands on experience to work in various area of civil engineering.							
The objective of the design project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental , design or combination of these in the area of Civil Engineering. Each project shall have a guide. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The evaluation is based on committee for 100 marks.								
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 90		Total Hours :90		
Programme Out come		The students will be able to perceive the problems and to find suitable solutions						

## VIII SEMESTER

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VIII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE T81	CONSTRUCTION MANAGEMENT	4	0	0	4	25	75	100
Objective (s)	1. To understand construction management importance 2. To become aware on organization, planning, scheduling and analysis 3. To study the M.I.S and labour, safety and related regulation							
Unit – I	Construction Project Management					Total Hours: 12		
Construction Project- Project Categories, Management objectives, functions – Project Development Process- Project Life Cycle- Project Team-Role of Project Manager-Management failure								
Unit-II	Organization and Planning					Total Hours: 12		
Definition, Levels of Organization, Principles of Organization, process of organizing, Span of Control, Authority, Responsibility and Delegation –Forms of Organizations-merits and demerits of each..								
Unit-III	Scheduling and Network Analysis					Total Hours: 12		
Scheduling: Definition, objectives, Importance of Planning, Scheduling and Controlling of Projects. Network Techniques in Construction Management- Bar Chart, Gaint Chart, PERT, CPM, Time& cost optimization								
Unit-IV	Contracts					Total Hours: 12		
Types of Contract, Contract document, Specification, Condition of Contract, Tender and Tender documents- Deposits by the Contractor- Arbitration-M.Book-Muster roll-Stores.								
Unit-V	M.I.S Applications and Construction					Total Hours: 12		
Labour Legislations-Safety in Construction: Objectives, Steps in Safety Programme, Safety Costs, Safety Codes, Occupational Safety and Hazards, Accidents- Causes of Accident								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours :60		
Programme Out come		One should aware on importance of construction management having the various influence factors in the process of management						
Text Books								
1.Clifford J Schexnayder, Kraig Knutson, Construction Management Fundamentals, Tata McGraw-Hill, 2011. 2.Ps Gahlot, Bm Dhir, Construction Planning & Management, New Age International (P) Ltd., 2014								
Reference Books								
1. Chitkara.K.K., Construction Project Management Planning Scheduling and Controlling, Tata McGraw-Hill, 2014. 2. Shrivastava. U.K, Construction Planning & Management, Galgotia Publications Pvt. Ltd.,2014. 3. Kumar Neeraj Jha, Construction Project Management Theory & Practice, Pearson Education Ltd., 2014. 4. Ravindra.S.V., Krishnamurthy.K.G., Construction & Project Management, CBS Publishers, 2010.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VIII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE P81	<b>PROFESSIONAL ETHICAL PRACTICE</b>	4	0	0	2	100	-	100
<b>Objective (s)</b>	1. To create an awareness of ethical concerns and conflicts and to Enhance familiarity with codes of conduct 2. To Increase the ability to recognize and resolve ethical dilemmas							
<b>UNIT – I</b>					Total Hours : 12			
Indian Constitution : Structure – Preamble - Fundamental Rights – Directive Principles of State policies - Fundamental Duties – overview of articles & Schedules.								
<b>UNIT – II</b>					Total Hours : 12			
Ethics - Ethical Behaviour : Moral Sensitivity – Moral Judgement – Moral Motivation – Moral Courage. Ethical Decision Making – Check points – Steps – Moral Compass								
<b>UNIT – III</b>					Total Hours : 12			
Professional Ethics as applied to Engineering – Characteristics of Professional and Professional Ethics – Engineering Ethics. Professional Code of Ethics – IEI & NSPE.								
<b>UNIT – IV</b>					Total Hours : 12			
Engineering Ethics : Honesty – Responsibility to Employer – Rights of Engineers – Responsibility towards public – Risk and Liability								
<b>UNIT – V</b>					Total Hours : 12			
Responsibility towards Environment. International Engineering Professionalism								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		1. The students will be exposed to the ethical practices in Civil Engineering. 2. The student will be aware to duties and responsibilities as a citizen 3. Educated in identifying ethical problems and Ethical solutions.						
<b>Reference Books</b>								
1. Charles E Harris Jr, Michael S Pritchard, Michael J Rabins, Engineering Ethics Concepts and Cases, Cengage Learning 2012. 2. Mike W.Martin, Roland Schinzinger, Ethics in Engineering, Tata MaGraw Hill Education (P) Ltd., 2012								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VIII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE IV8	INDUSTRIAL TRAINING/INTERNSHIP	-	-	-	2	100	-	100
Objective (s)		During the course of study from 3rd to 7th semester each student is expected to undertake a minimum of six industrial visits (or) undertake a minimum of four weeks of industry/field training. The students are expected to submit a report, which shall be evaluated by an internal assessment committee at the end of seventh semester for 100 marks.						
Total Contact Hours : 0		Total Tutorials : 0		Total Practical Class : 160		Total Hours : 160		
Programme Out come		After the Training programme, the student should have developed self-confidence, so that he/she becomes employable						

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
Semester VIII								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE PW8	PROJECT WORK –PHASE- II	0	0	9	8	50	50	100
Objective (s)	The students will be encouraged to handle the field problem independently							
Project work phase II will be an extension of the project work Phase-I started in the seventh semester. On completion of the work, a project report should be prepared and submitted to the department. The project work and the report will be evaluated by an internal assessment committee for 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.								
Total Contact Hours : 15		Total Tutorials : 0		Total Practical Class : 135		Total Hours :135		
Programme Out come		Students by the end of the course would have confidence to tackle any problems in the field and will become employable.						



## ELECTIVE SUBJECTS

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E01	DESIGN OF PRESTRESSED CONCRETE STRUCTURES	3	1	0	4	25	75	100
Objective (s)	1. To make the students understand the basic concept of pre stressed concrete structures. 2. To analyse a few important pre stressed concrete elements 3. To understand the various codal provisions for the design of prestressed concrete structures.							
Unit – I	Basic Principle of preadressing				Total Hours: 9			
Introduction-Principles of pre-stressing-Materials-Losses-Systems of pre-stressing-Simple cable profiles-Load balancing method.								
Unit – II	Prestressed Concrete Beams				Total Hours: 9			
Pre-tensioned and Post-tensioned beams-Principles of designs-Design for flexure, bond and shear – IS Code provisions-Ultimate Strength of pre-stressed concrete beams in flexure and shear- Design of end anchorage Zones using I S Code method.								
Unit – III	Deflections and Composite Beams				Total Hours: 9			
Deflection of pre-stressed concrete members – Methods of pre-stressing-principles of partial pre-stressing – non-pre-stressed reinforcements-Analysis and Design of composite beams.								
Unit-IV	Axial and Circular prestressing				Total Hours: 9			
Design of Tension and Compression members-Circular pre-stressing-Pipes- Water Tanks- Analysis and design –IS-Code provisions								
Unit- V	Prestressed continuous Beams				Total Hours: 9			
Analysis of continuous beams –Primary moment-secondary moment-cable layout-Linear Transformation – Concordant cable.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours :60		
Programme Out come		The student shall have a basic knowledge of the prestressed concrete elements, design of beams, bridge elements and water tanks.						
Text Books								
1. Krishna Raju. N., Prestressed Concrete, Tata McGraw-Hill, 2013. 2. Sinha.N.C, Roy.S.K, Fundamentals of Prestressed Concrete, S.Chand & Company (P) Ltd.,2013.								
Reference Books								
1. Rajagopalan.N., Rajagopalan.N, Prestressed Concrete, Narosa Publishing House, 2013. 2. Dayaratnam. P. Prestressed Concrete Structures, Oxford & I B H, 2013. 3. Pandit. G.S, Gupta. S.P, Prestressed Concrete, CBS Publishers and Distributors, 2013. 4. Lin. T.Y. , Ned H Burns, Design of Pre-stressed Concrete Structures, John Wiley & Sons, 2013.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E02	COASTAL AND OFFSHORE STRUCTURES	4	0	0	4	25	75	100
Objective (s)	1. To introduce the various components in Harbour and offshore structures. 2. Introduce to the students, planning and design principles of various components in Docks and harbours. 3. To develop an idea about types off offshore structures forces on offshore structures design concepts and foundation for offshore structures.							
UNIT – I	Growth of Ports				Total Hours : 12			
History of Port – Classification of Harbours - Factors affecting the growth of Port. Requirement of a Harbour - General Planning - Site investigation. Description of selected Indian ports.								
UNIT – II	Harbour Planning (Technical):				Total Hours : 12			
Harbour entrance - Navigational Channel – Depth of harbour – Turning basin – berthing area – Shipping terminal facilities – Essentials of passenger terminal, dry bulk cargo terminal, Liquid bulk cargo terminals and container terminals. Navigational aids – Light house.								
UNIT – III	Harbour Structures				Total Hours :12			
Break waters: Types – Selection – Forces and – Design principles of break waters. Berthing structures: Types – Loads – Selection and design principles of berthing structures –Selection and Design principles of Dock fenders and Mooring accessories. Types of dock structures, Dredging.								
UNIT – VI	Offshore Structure				Total Hours : 12			
Types of offshore structures – selection – function - Physical, environmental and geotechnical aspects of marine and offshore construction – Loads and responses of offshore structures.								
UNIT – V	Construction of Offshore Structures				Total Hours : 12			
Foundations for offshore structures – Introduction to design and installation of offshore piled platforms, concrete offshore platforms, Moored floating structures and Submarine pipelines								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		Student will be familiarized with the terminology and fundamental concepts of planning designing coastal and offshore structures.						
Text Books								
1. Narasimhan & S. kathioli, Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol – II, NIOT- Chennai 2. Chakrabarti.,S.K., Hand Book of Offshore Engineering (Vols. 1 & 2)” Elsevier Publications								
Reference Books								
1. Gerwick, C., Construction of Marine and Offshore structures, CRC Press. 2. Alonzo Def. Quinn., Design and construction of Port and Marine structures McGraw Hill Book co.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E03	<b>INDUSTRIAL WASTE DISPOSAL AND TREATMENT</b>	4	0	0	4	25	75	100
<b>Objective (s)</b>	1.To have a knowledge on the uses of water by industries 2.To understand the process involved in industries and their waste water production 3.To learn about the treatment of waste water and safe disposal of treated effluents							
<b>UNIT – I</b>	<b>Introduction</b>				Total Hours : 12			
Uses of water by Industry - Sources and types of wastewaters, quality criteria, effluent standards- Individual and common effluent treatment plants - Population equivalent, Effects of industrial wastes on streams, land, air and waste water treatment plants								
<b>UNIT – II</b>	<b>Pretreatment methods</b>				Total Hours : 12			
Pretreatment Methods: Process modification – methods and materials changes – Reduce, reuse and recycle methods, house keeping etc. to reduce waste discharge and strength of the waste and established methods for by products recovery within the plant operations								
<b>UNIT – III</b>	<b>Treatment methods of industrial wastes</b>				Total Hours : 12			
Equalization – Neutralization - Oil separation – Flootation – Precipitation –Adsorption - Aerobic and anaerobic biological treatment - High rate reactors. Chemical oxidation – Ozonation –Ion Exchange – Membrane technologies								
<b>UNIT – IV</b>	<b>Treatment methods of residuals</b>				Total Hours : 12			
Residuals of Industrial waste treatment —Characteristics of sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge.								
<b>UNIT – V</b>	<b>Case studies</b>				Total Hours : 12			
Industry and power plants - manufacturing process description - wastewater characteristics and waste treatment flow sheet for typical industries – Textiles – Tanneries – Pulp and Paper –Metal finishing – Petroleum refining – Chemical industries - Sugar and distilleries –Dairy –Iron and Steel- Fertilizers –Nuclear power plants.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		An ability to use the recent techniques, skills, and modern engineering practices to solve problems related to Industrial Waste Water management and Disposal.						
<b>Text Books</b>								
1. Eckenfelder. W.W., Industrial Water Pollution Control, McGraw Hill, 2000. 2. Arceivala.S.J. Wastewater Treatment for Pollution Control, Tata Mc.Graw Hill. 2008.								
<b>Reference Books</b>								
1. Nemerow,N.L., Theories and Practices of Industrial Wastes Treatment, Addison and Wesley, 1963. 2. Gurnham,C.F., Principles of Industrial Waste Treatment, John Wiley, New York,1948.								

Department :Civil Engineering				Programme: B.Tech. Civil Engineering				
ELECTIVE SUBJECT								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E04	<b>SAFETY PRACTICES IN CONSTRUCTION</b>	4	0	0	4	25	75	100
<b>Objective (s)</b>	1. To study and understand the various safety concepts and requirements applied to construction projects. 2. To study of construction accidents, safety programmes, contractual obligations 3. To study safety procedures to be followed for various construction activities							
<b>UNIT - I</b>	<b>Accidents and Related Law</b>				Total Hours : 12			
Construction accidents - Construction Safety Management: Importance - causes of accident, Construction industry related laws. Legal and financial aspects of accidents in construction – occupational and safety hazard assessment.								
<b>UNIT– II</b>	<b>Safety Procedures</b>				Total Hours 12			
Elements of an Effective Safety Programmes - Job-site assessment - Safety Meetings - Safety Incentives. Contractual Obligations - Substance Abuse - safety Record Keeping Safety Culture - Safe Workers-.								
<b>UNIT–III</b>	<b>Safety Workers and Managements</b>				Total Hours 12			
Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety - Project Coordination and Safety Procedures - Workers Compensation -Accident prevention-cost of accidents-accident reporting investigation								
<b>UNIT–IV</b>	<b>Safety Methods</b>				Total Hours:12			
Total loss control and damage control-Safety sampling- safety audit - safety equipment -planning and site preparation- safety system of storing construction materials-Excavation - blasting- timbering-scaffolding- safe use of ladders								
<b>UNIT–V</b>	<b>Safety Equipments</b>				Total Hours:12			
Safety in hand tools- Safety in Hoisting apparatus and conveyors- Safety in the use of mobile cranes-Manual handling- Safety in demolition work- Trusses, girders and beams- Fire hazards and preventing methods.								
Total Contact Hours :60		Total Tutorials : 0		Total Practical Class: 0		Total Hours :60		
<b>Programme Outcome</b>		On completion of this course the students will be able to know various constructions safety concepts and safety procedures						
<b>Text Books</b>								
1. Mishra. R.K., Construction Safety, Aitbs Publishers, 2012. 2. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997								
<b>Reference Books</b>								
1. Tamilnadu Factory Act, Department of Inspectorate of factories, Tamil Nadu. Health Management, Prentice Hall Inc., 2001. 2. Bhattacharjee. S.K., Safety Management in Construction Principles & Practice,Khanna Publishers, 2011. 3. Hand Book on Construction Safety Practices, SP:70, BIS, 2001. 4. Muraleedharan Pillai.K, Construction Safety Hand Book, Sujatha Publishers, 2012.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering				
ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E05	CONSTRUCTION METHODS AND EQUIPMENT	4	0	0	4	25	75	100
Objective (s)		1. To introduce various construction equipments, selection and apply scientific principles for effectively utilizing them 2. To make aware of the various techniques and practices on construction of various civil engineering structures. 3. To study and understand the latest construction techniques applied to engineering Construction						
UNIT – I	Excavation				Total Hours : 12			
Excavations for foundations and Basement floors – Methods – temporary earth retaining structures: braced wall, sheet pile wall, soil nail wall – Dewatering methods – water proofing methods – Trenching - Excavators – pumps. Under water concreting.								
UNIT – II	Sub structures				Total Hours : 12			
Methods and equipments for: Pile foundation, well foundation, cofferdam. Shoring and under pinning – Pile wall - RCC Diaphragm walls.								
UNIT – III	Super Structures				Total Hours : 12			
Methods and equipments for: Scaffolding, Form work, Hoisting and Rigging (cranes), plastering and flooring. Concrete: Aggregates, RMC plants, pumping, finishing, - shotcreting – Building Demolition Techniques.								
UNIT – IV	Bridges				Total Hours : 12			
Methods and equipments for RCC & Cable stayed Bridges: Balanced cantilever method, Span by Span Method, Incremental launching methods.								
UNIT – V	Roads and Tunnels				Total Hours : 12			
Methods and equipments for construction Flexible and rigid pavements, Tunnels in soft ground- Cut and cover method, TBMs, Tunnel Lining.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		To develop an understanding of the methods adopted in construction of high rise buildings with basement floors and to optimize the construction by using right equipments.						
Text Books								
1. Antil J.M., Civil Engineering Construction, McGraw Hill Book Co., 1982 2. Peurifoy, R.L., Clifford.J.,et al.,Construction Planning, Equipment and Methods McGraw Hill Co, 2011								
Reference Books								
1. Varma., M., Construction Equipment and its Planning & Application, Metropolitan Book Co., 1979 2. Smith, R.C, Andres, C.K Principles and Practice of Heavy Construction, Prentice Hall, 1986 3. Chew, M. Y. L., Michael Chew Yit Lin Construction Technology for Tall Buildings, 3 <sup>rd</sup> Ed., World Scientific Publishing Co. Pte. Ltd., 2009								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E06	<b>GEOTECHNICAL PROCESSES AND APPLICATION</b>	4	0	0	4	25	75	100
<b>Objective (s)</b>		1. To provide the students the basic understanding of various ground improvement techniques 2. To introduces the students the concept of physical, chemical modification of soil using various techniques.						
<b>UNIT – I</b>						Total Hours : 12		
Introduction: Need – methods – suitability – Mechanical modification : principle - Surface compaction: Field compaction and equipments, compaction specification and controls. Vibration methods: dynamic consolidation, vibratory rollers, Vibro floatation.								
<b>UNIT – II</b>						Total Hours : 12		
Drainage methods: Well point systems, deep well drainage, vacuum dewatering system, design of dewatering system – field permeability tests, dewatering by electro osmosis. Preloading, sand drains, wick drains- Thermal methods case studies.								
<b>UNIT – III</b>						Total Hours : 12		
Grouting: Classification – Methods – Types – grouts – equipments, grouting design and layout, grout monitoring – applications – Case studies.								
<b>UNIT – IV</b>						Total Hours : 12		
Stabilization: cement stabilization, Lime stabilisation – chemical stabilistion - methods, principles, applications and field control. Stabilization using reinforcement – rock anchor- soil tie backs.								
<b>UNIT – V</b>						Total Hours : 12		
Geo synthetics: Geotextiles, Geogrids, Geomembranes, Geonets, Geomats, Geomeshes, principles Design and applications – Case studies.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
<b>Programme Outcome</b>		Students are expected to identify problematic soil and their associated problems, propose suitable remedial techniques and design.						
Text Books								
1. Purushothama raj. P. Ground improvement techniques, Laxmi Publications (P) Ltd, India, 2007 2. Hausmann. M.R. Engineering principles of Ground Modification, McGraw-Hill, 2009								
Reference Books								
1. Koerner, R.M., Construction & Geotechnical methods in foundation engineering, MGH, New York,1985 2. Jones.C.J.F.P., Earth reinforcement and soil structures, Butter worth &co., London,1985 3. Sivakumar babu. G.I., Introduction to Soil Reinforcement & Geosynthetics, Universities Press Ltd., 2013								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P		C	IA	UE
CE E07	REMOTE SENSING AND GIS	4	0	0	4	25	75	100
Objective (s)		1. To introduce the students to the basic concepts and principles of various components of remote sensing. 2. To provide an exposure to GIS and its practical applications in civil engineering.						
UNIT – I	EMR and its interaction with atmosphere & earth material				Total Hours : 12			
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions, important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein’s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.								
UNIT – II	Platforms and sensors				Total Hours : 12			
Types of sensor systems-Types of remote sensing platforms – remote sensing satellite orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space-borne TIR and microwave sensors.								
UNIT – III	Image interpretation and analysis				Total Hours : 12			
Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.								
UNIT – IV	Geographic information systems				Total Hours : 12			
Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).								
UNIT – V	Data entry, storage and analysis				Total Hours : 12			
Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		The students will be familiarized with basic concepts of remote sensing and GIS and their applications in Civil Engineering.						
Text Books								
1. Kumar.S., Basics of Remote Sensing &GIS, Lakshmi Publications, 2014. 2. Narayana.L.R.A, Remote sensing and its applications, University Press (India)Ltd., 2011.								
Reference Books								
1. Lillesand, T.M., Kiefer, R.W. and J.W.Chipman. (2004). Remote Sensing and Image Interpretation. V Edn. John Willey and Sons (P) Ltd., 2013. 2. Ghosh.S.K., Chandra.A.M, Remote Sensing & Geographical Information System, Narosa Publishing House, 2006. 3. Kali Charan Sahu, A Text Book of Remote Sensing & Geographical Information Systems, Atlantic Publishers, 2008. 4. Anji Reddy.M., Textbook of Remote Sensing and Geographical Information System,. BS Publications, 2014.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E08	FINITE ELEMENT ANALYSIS	3	1	0	4	25	75	100
Objective (s)	1.To gain basic knowledge in modeling of structures using finite element Methods 2.To understand the concepts of developing finite elements and FE packages							
UNIT – I	Introduction				Total Hours : 9			
Need for Numerical Technique – Solutions to Differential Equations –Finite Difference Methods – Limitations Variation and Weighted Residual and Potential energy formulations – Finite Element Method – Basic steps.								
UNIT – II	I-D elements				Total Hours : 9			
Shape functions – convergence Criteria –Geometric Invariance – Pascal’s Triangle – Shape Functions for one Dimensional Structures - Formulation of Element Matrix - Formation of Element Nodal load Vector - Coordinate systems –Global , Local & Natural – Formation of global stiffness matrix - Formation of global load vector .								
UNIT – III	II – D Elements				Total Hours : 9			
Two dimensional elements – Plane stress – Plane strain – 3,6 Nodded Triangular elements – Rectangular elements – Lagrange and serendipity elements –Isoparmetric elements -shape functions, Element stiffness Matrix – Load vector formulations –Gauss Quadrate rule.								
UNIT – IV	Beam & III-D Elements				Total Hours : 9			
Beam elements –Axisymmetric elements Tetrahedral, hexahedral elements –Formation of shape functions only.								
UNIT – V	Solution Techniques				Total Hours : 9			
Mesh generation techniques – static condensation. Solution Techniques- Gauss elimination –Matrix Decomposition – Frontal solvers. Requirements of Pre and post processor in GUI based FE packages. Demo of modelling using FEM pakages.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Out come		An ability to generate the shape functions of various elements used in FE packages understand the assembly and solution techniques.						
Text Books								
1. Rajasekaran.S, Finite Element Analysis in Engineering Design, S.Chand Company (p) Ltd.,2013. 2.Krishnamoorthy,C.S, Finite Element Analysis – Theory and Programming , Tata Mc Graw-Hill, 2014.								
Reference Books								
1. Reddy.J.N., Introduction to the Finite Element Method, Tata Mc Graw-Hill, 2013. 2. Cook, R.D, M.E.Plesha, D.S.Malkus, Concepts and applications of Finite element Analysis, John Wiley and Sons, 2013. 3. David V Hutton, Finite Element Analysis, Tata Mc Graw-Hill, 2012. 4. Bhavikatti.S.S., Finite Element Analysis, New Age International (P) Ltd.,2013.								



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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E09	<b>ADVANCED RCC STRUCTURAL DESIGN</b>	3	1	0	4	25	75	100
<b>Objective (s)</b>	To understand the design of special RCC structures in civil engineering, by using the basic concepts of design of RCC structural elements as per Indian standards							
<b>UNIT – I</b>	<b>Design of Wall and Beam-Column Joint</b>				Total Hours : 9			
Design of Cantilever and Counterfort Retaining walls, Design of Plain Concrete Walls, Design of Beam Column Joints.								
<b>UNIT – II</b>	<b>Design of Slabs and Floors</b>				Total Hours : 9			
Design of Flat Slabs, Design of Slabs by Yield Line theory and Hillerborg’s Strip method, Design of Grid floors by Approximate Analysis								
<b>UNIT – III</b>	<b>Design of Beams and Serviceability Requirements</b>				Total Hours : 9			
Design of Deep Beams, Design of beams curved in Plan, Deflection of RCC beams, Estimation of Crack width in RCC Beams, Redistribution moments in RCC beams								
<b>UNIT – IV</b>	<b>Design of Storage Structures for dry and liquid materials</b>				Total Hours : 9			
Design of Bunkers and Silos, Design of Overhead Circular and Rectangular Water Tanks (without staging)								
<b>UNIT – V</b>	<b>Design of Formwork, Composite beam and Beam with fire resistance</b>				Total Hours : 9			
Introduction to Formwork, Design of Formwork for wall, column, beam and slab elements, Introduction to Composite Construction, Design of Steel-Concrete Composite beams, Design of beams with cast in situ slab.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		Student should able to design industrial structures and formwork for construction.						
<b>Text Books</b>								
1. Varghese,P.C., Advanced Reinforced Concrete Design, Prentice-hall of India (p) Ltd., 2012. 2. K. N.Jha, “Formwork for Concrete Structures” Mc Graw Hill Education Pvt Ltd, New Delhi 2012								
<b>Reference Books</b>								
1. Shah.V.L and Karve S.R, Limit State Theory & Design of Reinforced Concrete-IS 456 2000,Standard Publishers, 2013. 2. Sinha, S.N., Reinforced Concrete Design, Tata Mc Graw-Hill, 2014. 3. Johnson, R.P, Composite Structures of steel and concrete, Black Well Publishing, 2011. 4. Unnikrishna Pillai.S, Devdas Menon, Reinforced Concrete Design, Tata Mc Graw-hill, 2013								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E10	<b>SITE INVESTIGATION METHODS AND PRACTICES</b>	4	0	0	4	25	75	100
<b>Objective (s)</b>	1. To introduce the various stages of site investigation.							
	2. To familiarize the students to various provisions in IS codes, methods of investigation, interpretation of data and final recommendations for various construction works.							
<b>UNIT – I</b>							Total Hours : 12	
Objectives of site investigation - various stages in site investigation process. Planning and Desk Study - topographic maps, aerial photographs - interpretation of aerial photographs, applications in site investigation , Geological maps, minerals and mining records, soil planning maps, site reconnaissance and local enquiries.								
<b>UNIT – II</b>							Total Hours : 12	
Geological methods - different stages, Geological exploration methods –Areal mapping , site mapping and construction mapping-Rock mass characterization- Discontinuities in rocks ,Rock core descriptors , Rock mass classification, RQD, Rock mass rating, Rock structure rating , Q-system- General principle distribution of physical field in subsurface - Electrical resistivity, Seismic refraction methods, their principle, methods of survey, correction to field data, Interpretation and limitations. Index and Mechanical properties of rocks, Laboratory and insitu tests.								
<b>UNIT – III</b>							Total Hours : 12	
Trial pits, shafts, tunnels, auguring, and different types of drilling methods, their merits and demerits, Bore hole logging techniques (subsurface geophysical exploration) - Need for logging techniques, classification and different types logging methods.								
<b>UNIT – IV</b>							Total Hours : 12	
Soil Exploration methods, samples, sampling procedure, sample disturbances, samplers, Factors controlling spacing and depth of bore hole, Insitu tests, SPT, SCPT, Pressure meter tests, interpretation and application, Index properties , Laboratory testing.								
<b>UNIT – V</b>							Total Hours : 12	
Technical Report writing, report format, recommendations for earth work structures, highway excavations and drainage works, dams, check report site preparation, investigation during construction and operation.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
<b>Programme Outcome</b>		Student is expected to have ability to carry out the investigations required under various stages, interpret the field data and arrive at final recommendations for different types of construction works.						
<b>Text Books</b>								
1. Joyce, M.D. ‘Site Investigation Practice’, ESFN. SPON Publishers, 1982.								
<b>Reference Books</b>								
1. Hunt, R.E., Geotechnical Engineering Analysis and Evaluation, McGraw Hill Book Company, 1986.								
2. Bell.F.G., Engineering Geology, Elsevier India Pvt.Ltd., 2007.								
3. Blyth, F.G.H. and Freitas, M.H.D.E., Geology for Engineers, Elsevier India (P) Ltd.,2006.								
4. Legget and Karrow, Hand book of Geology in Civil Engineering, McGraw Hill Publishers, 1983.								

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ELECTIVE SUBJECT										
Course Code	Course Name			Hours / Week		Credit	Maximum Marks			
				L	T	P	C	IA	UE	Total
CE E11	COASTAL ENGINEERING			4	0	0	4	25	75	100
Objective (s)		1. To enable students apply these engineering principles to solve the problems in this environment such as shoreline erosion, natural flooding hazards, water quality deterioration and coastal habitat evanescence. 2. To know the basics and features of coastal waters and coastal ecosystems. 3. To study classification, characteristics, and theories of waves, tides and currents. 4. To learn about coastal processes and manmade structures.								
UNIT – I		Coastal zone					Total Hours : 12			
Definition and sub division – Factors influencing coastal topography - Waves: Definitions - Classification – Liner wave theory – Assumptions and derivations of relationships – Pressure within progressive wave – Wave energy - Problems										
UNIT – II		Wave Transformation					Total Hours : 12			
Wave generation – Shoaling – Refraction – Reflection – Diffraction – Breaking of waves – Near shore currents – Tides - Tsunamis - Wave Hindcasting – forecasting - Sea level changes.										
UNIT – III		Wave forces on Structures					Total Hours : 12			
Force due to non breaking, breaking and broken waves on vertical, sloping, curved, stepped barriers and on piles – Problems.										
UNIT – IV		Sediment Movement					Total Hours : 12			
Types – Littoral Drift – Erosion process – Near shore, long shore currents and effects - Beach profile changes – case studies – Beach process - Environmental parameters- Coastal erosion in India - Dredging – Dredgers - Environmental effects of dredging - Remote sensing and GIS application in coastal engineering										
UNIT – V		Coastal Protection					Total Hours : 12			
Methods – Function – Types - Design concepts – Sea walls – Bulkhead – Revetment – Groins – Artificial beach nourishment – Scour – Maintenance of coastal structures.										
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0			Total Hours : 60			
Programme Outcome		1. To provide an overview of the analysis and design procedures used in the field of coastal engineering. 2. To introduce the processes of including coastal and estuarine circulation, coastal and shelf waves, surf zone hydrodynamics, sediment transport, beach nourishment etc								
Text Books										
1. Shore Protection Manual (Vol – I, II, III) U.S. Army Corps of Engg. USA. 2. Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol – II; S. Narasimhan & S. kathirolu, NIOT- Chennai										
Reference Books										
1. Ippen, A.T., Estuarine and coastline Hydrodynamics, McGraw Hill Book Co., New York 2. Wiegel. R.L. Oceanographical Engineering., Prentice Hall, Eagle Wood Cliffs, New Jercy 3. Dean .R.G. and Darymple, R.A. Water Mechanics for Engineers and scientists.										

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E12	<b>TRAFFIC ENGINEERING AND MANAGEMENT</b>	3	1	0	4	25	75	100
<b>Objective (s)</b>	Students are expected to learn the importance of traffic engineering and relationship between the traffic engineering & management.							
<b>UNIT – I</b>	<b>INTRODUCTION</b>				Total Hours : 9			
Significance and scope, characteristics of vehicles and Road users, Skid Resistance and braking Efficiency(Problems), Components of Traffic Engineering-Road, traffic and land Use characteristics								
<b>UNIT – II</b>	<b>Traffic Surveys and analysis</b>				Total Hours : 9			
Surveys and analysis- Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety level of Services- Basic Principles of Traffic Flow								
<b>UNIT – III</b>	<b>Traffic Control</b>				Total Hours : 9			
Traffic Signs, Road Markings, Design of Traffic Signals and Signal Co ordination(Problems), Traffic Control Aids and Street Furniture, Street Lighting, Computer applications in signal design								
<b>UNIT – IV</b>	<b>Geometric Design of Intersections</b>				Total Hours : 9			
Conflicts at Intersections, Classification of ‘At Grade Intersections,- Channelized Intersections-Principles of Intersection Design, Elements of Intersection design, Rotary Design, Grade Separation and interchanges- Design principles								
<b>UNIT – V</b>	<b>Traffic Management</b>				Total Hours : 9			
Traffic Management- Transportation System Management (TSM) – Travel Demand Management (TDM), Traffic Forecasting Techniques, Restrictions On Turning Movements, One Way Streets, Traffic Segregation, Traffic Calming, Tidal Flow Operations, Exclusive Bus Lanes, Introduction To Intelligent Transportation System(ITS)								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
<b>Programme Out come</b>		1. Student should have learnt basic terminology of traffic engineering . 2. He should have learnt the importance of carrying out traffic surveys & its interpretation. 3. Should appreciate the importance of Management concepts.						
<b>Text Books</b>								
1. Kadiyali L. R., Traffic Engineering and Transport plannnng, Khanna publications, 2014. 2. Khanna K and Justo CEG, Highway Engineering, Khanna publishers, Roorkee, 2014								
<b>Reference Books</b>								
1. IRC Specifications: guidelines and special Publications on Traffic planning and Management 2. Jotin Khisky C. and Kent Lall B, Transportation Engineering, Prentice Hall of India Pvt. Ltd. 2012 3. Hutchinson C., Urban transport Planning, John Wiley publications, 2012								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E13	HIGHWAY AND AIRPORT PAVEMENT DESIGN	3	1	0	4	25	75	100
Objective (s)	1. Students are expected to understand the difference between highway airport pavements. 2. He should understand the analysis and design of pavement for the above two cases							
UNIT – I	Pavement types				Total Hours : 9			
Stress distribution in pavements – theoretical subgrade conditions and traffic loadings Basic difference between flexible and rigid pavements – design factors – wheel load – equivalent single wheel load – repetition of loads – elastic moduli – climatic variations.								
UNIT – II	Flexible Pavements				Total Hours : 9			
Design of flexible pavements: group index method – CBR method – IRC – 37 recommendations – Mc Load method – Burmister’s layer theory, FEM method								
UNIT – III	Rigid Pavements				Total Hours : 9			
Design of rigid pavements: radius of relative stiffness – critical load positions – Westergaard’s stress equation – Bradley’s stress coefficients – design charts, FEM method.								
UNIT – VI	Concrete Pavements				Total Hours : 9			
Temperature stresses in concrete pavements: Westergaard’s concept – wrapping stress – functional stress – combination of stresses. Design of joints in concrete pavements: expansion joints – construction joints – design of dowel bars – tie bars – IRC recommendation.								
UNIT – V	Condition Assessment				Total Hours : 9			
Evaluation of pavement condition: pavement instrumentation – types of pavement distress – roughness and skid resistance. Environmental influence and effects- pavements maintenance and overlays								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		By the end of the course the student should have understood the difference between the flexible and rigid pavement.						
Text Books								
1. Khanna O.P, Justo C.G., Highway Engineering, Nem Chand Publishers, 2014 2. Sharma, S. K., Principles practice and design of highway engineering, S. Chand & Co., New Delhi, 2013.								
Reference Books								
1. IRC - 37 Tentative guidelines for the design of Flexible pavements, 2012 2. IRC-58 Tentative guidelines for the design of rigid pavements 2012 3. Yoder. E.J, Witczak.M.W., Principles of Pavement design, Wiley India (P) Ltd., 2012.								

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ELECTIVE SUBJECT								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E14	<b>ADVANCED STRUCTURAL ANALYSIS</b>	3	1	0	4	25	75	100
Objectives	1. To cover the advanced methods of analysis of pin jointed and rigid jointed structures. 2. To introduce the students the importance of computer aided computing tools.							
<b>UNIT -I</b>	<b>Introduction to stiffness and flexibility methods</b>				Total Hours : 9			
Stiffness and flexibility characteristics of structures- stiffness and flexibility matrices- properties of stiffness matrix- stiffness and flexibility matrix relationship. Transformation matrices.								
<b>UNIT -II</b>	<b>Analysis of continuous beams</b>				Total Hours : 9			
Analysis of continuous beams with two or three unknowns by stiffness and flexibility method- support settlement- comparison of methods								
<b>UNIT -III</b>	<b>Analysis of rigid jointed frames</b>				Total Hours : 9			
Analysis of rigid jointed plane frames with two or three unknowns by stiffness and flexibility method- support settlement- choice of methods								
<b>UNIT -IV</b>	<b>Analysis of pin jointed frames</b>				Total Hours : 9			
Analysis of pin jointed plane frames with two or three unknowns by stiffness and flexibility method- lack of fit and temperature stress- comparison of methods								
<b>UNIT -V</b>	<b>Introduction to finite element method</b>				Total Hours : 9			
Bandwidth of stiffness matrix- static condensation – introduction to computed aided structural analysis and finite element method								
Total Contact Hours: 45		Total Tutorials : 15		Total Practical Classes: 0		Total Hours : 60		
<b>Programme Outcome</b>		Student will able to apply matrix method of analysis for indeterminate structures and will understand the need for the computer aided analysis.						
<b>Text Books</b>								
1. Natarajan, C and Revathi, P, “Matrix methods of structural analysis-Theory and problems”, PHI learning Pvt Ltd. New Delhi 2014.								
2. Pandit, G.S and Gupta S.P, “Structural Analysis- A matrix approach”, Tata McGraw Hill Publishing, New Delhi 2014.								
<b>Reference Books</b>								
1. Wang. C. K., Intermediate Structural Analysis, Tata Mc Graw Hill, 2013								
2. Russell C Hibbeler, Structural Analysis, Pearson Education Ltd., 2013								
3. Khurmi. R.S., Theory of Structures, S.Chand & Company, 2012.								
4. Devdas Menon, Advanced Structural Analysis, Narosa Publishing House, 2012.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E15	GROUNDWATER HYDROLOGY	4	0	0	4	25	75	100
Objective (s)	1. Provide the basic understanding about the rock/soil properties affecting storage and transmission of groundwater and the fundamental principles governing the groundwater flow. 2. Introduce various methods to carry out pumping tests to assess aquifer characteristics. 3. To familiarize the concepts of well design, construction, development, completion and groundwater exploration and recharge techniques.							
UNIT – I	Fundamentals of groundwater				Total Hours : 12			
Introduction - need for ground water development, advantages of Groundwater, Groundwater in Hydrological cycle - types of aquifers- Rock properties affecting groundwater movement- Porosity, Specific yield , specific retention , Storage coefficient - Permeability and transmissibility - Laboratory and field measurement of permeability - Basic Principles and Fundamental Equation of continuity - Darcy’s law - General differential equation governing groundwater flow for steady and unsteady flows - Application of aquifers- Flow nets.								
UNIT – II	Well Hydraulics				Total Hours : 12			
Steady flow to a well in a confined aquifer, unconfined aquifer and a leaky confined aquifer - Unsteady flow to a well in a confined aquifer, an unconfined and a leaky confined aquifer-- Partially penetrating wells - Method of images - Analysis of pump test data for the above aquifers - Problems.								
UNIT – III	Water wells				Total Hours : 12			
Types of wells - well design - construction - well development - Testing of wells for yield - well completion and sanitary protection of wells.								
UNIT – IV	Groundwater exploration techniques				Total Hours : 12			
Surface investigations- geological , geophysical exploration, Remote sensing- Subsurface exploration methods ( well logging methods)								
UNIT – V	Groundwater quality and salt water intrusions				Total Hours : 12			
Physical , chemical and biological quality of groundwater- salinisation of groundwater, quality criteria for groundwater use, salt balance- saltwater intrusion – prevention and control - Artificial Recharge methods.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		The student should be able to carry out pumping test and interpret the result to find out the aquifer characteristics, recharge and barrier boundaries. Also, the student should be able to carry out groundwater exploration, design, construction, development and completion of wells.						
Text Books								
1. Todd . D.K., Groundwater Hydrology, John wiley and Sons, 2014. 2. Raghunath, H.M. ,Ground water, New Age International (P) Ltd., 2014.								
Reference Books								
1. Schwartz.F.W., Zhang.H., Fundamentals of Ground Water, John Wiley & Sons (P) Ltd., 2012. 2. Walton W.C., Groundwater Resources Evaluation, McGraw Hill Book Co., 2012. 3. Abdel, Aziz Ismail Kashef, Groundwater Engineering, McGraw Hill Book Co., 2012. 4. Karanth KR, groundwater assessment, development and management, Tata McGraw Hill, 2009.								

Department : Civil Engineering				Programme : B.Tech. Civil Engineering						
ELECTIVE SUBJECT										
Course Code	Course Name			Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
CEE16	MACHINE FOUNDATIONS			3	1	0	4	25	75	100
Objective (s)		1. To provide the student the basic concept of soil dynamics 2. Introduce the students the concept of analysis and design foundations subjected to dynamic loads. 3. To introduce the techniques to resolve problems associated with machine foundations								
UNIT – I		Theory of vibration					Total Hours : 9			
Introduction, nature of dynamic loads free vibrations of spring mass systems, forced vibrations viscous damping, principles of vibration measuring equipments.										
UNIT – II		Dynamic soil properties and behaviour					Total Hours : 9			
Dynamic properties of soils: Elastic properties of soils, coefficient of elastic uniform and non-uniform compression and shear, effect of vibration on the dissipative properties of soils , determination of dynamic properties of soils , Codal provisions.										
UNIT – III		Foundations Of Reciprocating Machines					Total Hours : 9			
Types of Machines and Foundations – General requirements – Modes of vibration of a rigid foundation, block method of analysis – Linear Elastic weightless spring method – Elastic half – space method – Analog models ; Design of Block foundation -- Codal Recommendations.										
UNIT – IV		Foundation For Impact And Rotary Machines					Total Hours : 9			
Dynamic analysis of impact type machines – Design of Hammer foundations – use of vibrator Absorbers – design – Codal recommendation. Special consideration for Rotary machines – Design criteria – Loads on T.G. Foundation – method of analysis – Design; Dynamic soil – structure – Interaction, Codal Recommendations.										
UNIT – V		Vibration Control					Total Hours : 9			
Vibration isolation, passive and active isolation, use of springs and springs and damping materials, construction aspects of machine foundations.										
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0			Total Hours : 60			
Programme Outcome		To understand the basics of dynamics – dynamic behaviour of soils – effects of dynamic forces and the various design methods.								
Text Books										
1. Srinivasulu.P., C. V. Vaidyanathan, Handbook Of Machine Foundations, Tata McGraw-Hill, 2012. 2. Bhatia.K.G., Foundations for Industrial Machines D-CAD Publishers, 2008 3. Kameswara Rao, N.S.V., Dynamics soil tests and applications, Wheeler Publishing , New Delhi, 2012.										
Reference Books										
1. Braja M. Das, G. V. Ramana Principles of Soil Dynamics Cengage Learning,2011 2. Shamshar Prakash , Vijaykumar Puri, Foundations for machines: analysis and design, John Wiley & Sons (P) Ltd, 2012. 3. Barkon,D.D., Dynamics of basis of foundation, MGH,1974. 4. Swami Saran, Soil Dynamics and Machine Foundation, Galgotia publications Pvt. Ltd., 2012.										



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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E17	EARTH RETAINING STRUCTURES	3	1	0	4	25	75	100
Objective (s)	1. To familiarize the concept of earth pressure, design of earth retaining structures. 2. To introduce the students the essential steps involved in design of temporary ERS 3. To introduce the techniques involved in construction temporary ERS.							
UNIT – I	Earth Pressures				Total Hours : 9			
Introduction, development of earth pressure theory, classical solutions, graphical techniques, active, passive cases, earth pressure due to external loads, Empirical approaches, arching of soil, stress distribution in shafts, around tunnels, buried conduits.								
UNIT – II	Retaining Walls				Total Hours : 9			
Gravity and cantilever Retaining walls, stability of retaining walls and check for stability, Earth quake forces - Mechanically stabilised retaining walls – General design methods – stability – walls with geotextile and geo grid.								
UNIT – III	Sheet Pile Walls				Total Hours : 9			
Types of sheet pile walls, analysis and design of cantilever and anchored sheet pile walls, construction methods.								
UNIT – IV	Coffer dams				Total Hours : 9			
Types and uses of coffer dams- analysis, design and stability of braced cofferdams – analysis, design and stability of cellular cofferdams - trenches - soil anchor - Design and construction.								
UNIT – V	Diaphragm Wall				Total Hours : 9			
: Analysis, design, Equipment and Construction method of Diaphragm wall – Slurry walls - pile wall, soldier pile and lagging walls, soil nailing wall- Design and construction.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours : 60		
Programme Outcome		At the end of this course, students are expected to analyse and design rigid, flexible earth retaining structures, slurry supported trenches and deep cuts						
Text Books								
1. Braja M. Das Principles of Foundation Engineering, Cengage Learning, 2009. 2. Robert M. Koerner Designing with Geosynthetics 6 <sup>th</sup> Edition, Volume 1 and Volume 2, Xlibris, Corp., 2012								
Reference Books								
1. Hajnal, I., Marton, J. and Regele, Z., Construction of diaphragm walls, A Wiley – Interscience Publication, 1984. 2. Militisky, J. and Woods, R., Earth and Earth retaining structures, Routledge, 1992. 3. Clayton, C.R.I., Militisky, J. and Woods, R.I., Earth pressure and Earth-Retaining structures, Second Edition, Survey University Press, 1993.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E18	UNDER GROUND STRUCTURES	4	0	0	4	25	75	100
Objective (s)	1. To introduce the students the concept of design of underground structures. 2. To introduce the various construction techniques in construction of underground structures.							
UNIT – I	Tunnel Planning				Total Hours : 12			
Tunnel – Types - elements - Layout – Survey and Alignment – Geotechnical Investigation – Deep Shafts Rock tunneling – Methods– Lining								
UNIT – II	Tunnel Construction Methods				Total Hours : 12			
Soft Ground Tunneling- Methods – TBMs - monitoring ground movement - Lining. Tunneling in Difficult Ground. Tunnel Boring Machines – Material Handling and construction plant.								
UNIT – III	Safety Provisions				Total Hours : 12			
Fire life safety – Tunnel Ventilation – tunnel Lighting – Drainage in tunnels – Tunnel Rehabilitation.								
UNIT – IV	Underground structures:				Total Hours : 12			
Advantages – Planning– planning for underground parking – civic facilities – Liquid storage facilities. – Construction Methods: cut and cover methods								
UNIT – V	Buried Structures				Total Hours : 12			
Design of buried pipelines – Box jacking - Trenchless Technology: construction Methods and Machines – Repair and rehabilitation of buried pipelines -								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Out come		To understand the basics of design and construction of underground structures.						
Text Books								
1. Tunnel Engineering Handbook 0002 Edition (Paperback) Authors: Thomas R. Kuesel, Elwyn H. King, John O. Bickel.CBS Publishers, New Delhi. 2. Trenchless Technology: Pipeline and Utility Design, Construction, and Renewal: Pipeline and Utility Design, Construction, and Renewal. Mohammad Najafi - McGraw Hill Professional								
Reference Books								
1. Introduction to Tunnel Construction. David N. Chapman, Nicole Metje, and Alfred Strk (Paperback) Alfred Stark, David N. Chapman, Nicole Metje. Applied Geotchnique Vol-3. Taylor and Francis. 2. Practical Tunnel Construction, Gray B. Hemphill, John Wiley & Sons.2013. 3. Technical Manual for Design and Construction of Road Tunnels--civil Elements – American Association of State Highway and transportation official (AASHTO) Washington DC. ISBN:978-56051-457-2. 4. Underground Infrastructures: Planning, Design, and Construction (Hardcover) Bhawani Singh, R. K. Goel, Jian Zhao. Butterworth – Heinemann-Elsevier ISBN: 978-0-12-397168-5								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E19	AIR AND NOISE POLLUTION	4	0	0	4	25	75	100
Objective (s)	1.To have a basic knowledge on the air pollution on environment 2.To understand the interaction of air pollutants on the meteorological parameters 3.To study about the control measures of air pollutants from various sources							
UNIT – I	Introduction				Total Hours : 12			
Definition of clean air –air pollutants - Sources and classification - Effects of air pollution on man, animal, vegetation and properties -Ambient Air Quality Standards, Air pollution control legislation.								
UNIT – II	Meteorology and Air pollution				Total Hours : 12			
Meteorology and Air pollution – Atmospheric stability – Inversions – Mixing height –Plume behaviour – Plume rise estimation – Effluent dispersion theories –Air pollutants Modelling.								
UNIT – III	Control of particulate pollutants				Total Hours : 12			
Control of Air pollutants: particulates – Filters – Gravitational settling chambers – Centrifugal-multiple type cyclones – Collection efficiency - Electrostatic precipitators – Wet collectors-Centrifugal spray scrubbers - Venturi scrubbers.								
UNIT – IV	Control of gaseous pollutants				Total Hours : 12			
Gaseous pollution control – Absorption - Principles – Description of equipment, Adsorption – Principal adsorbents – Equipment descriptions – Condensation – Contact condensers, Incineration –Equipment description								
UNIT – V	Control of Noise pollution				Total Hours : 12			
Sound and noise - Source of noise pollution - Environmental and industrial noise -Effects of noise pollution - Fundamentals of sound - generation, propagation, etc., Sound measurement, sound level meters – Measures for prevention and control of noise -Environmental and industrial noise - Noise control legislation.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours :60		
Programme Out come		An ability to formulate, analyze and solve problems related air environment caused by infrastructure development.						
Text Books								
1. Rao.M.N. et al., Air Pollution, Tata Mc.Graw Hill, 2013. 2. Rao.C.S., Environmental Pollution Control Engineering , New Age International Publishers, 2014.								
Reference Books								
1. Noel de Nevers, Air Pollution Control Engineering, Mc.Graw Hill, New York. 2012. 2. Stern, A.C., Air Pollution , Vol.I, II and III, Academic Press, 2012. 3. Cunniff, P.F., Environmental Noise Pollution, John Wiley and Sons, 2010.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E20	FAILURE ASSESSMENT AND REHABILITATION OF STRUCTURES	4	0	0	4	25	75	100
Objective (s)	1. To understand the deterioration process of materials 2. To know about repair materials 3. To assess the condition of the structure							
UNIT – I	Assessment of Structures					Total Hours : 12		
Condition Assessment – Procedure for assessment – survey – Field visits – inspection – Sampling – structural capacity – load testing – condition assessment of structures – NDT methods – Evaluation and health monitoring.								
UNIT - II	Deterioration Process					Total Hours : 12		
Agencies causing material deterioration - shrinkage, settlement, weathering, chemical attack, creep, fire, honey combing etc., durability of materials –Safety evaluation of existing structures								
UNIT - III	Cracks					Total Hours : 12		
Structural and non structural cracks -Types of structural distress in foundations, roofs, floors, walls.								
UNIT - IV	Repair Materials and Techniques					Total Hours : 12		
Repair Techniques - Materials for repair – Repair of concrete structures - bridges and water retaining structures – water proofing methods and materials - Non-structural repairs.								
UNIT - V	Corrosion Process & Monitoring of Structures					Total Hours : 12		
Factors influencing corrosion of rebar steel – Corrosion protection in concrete / steel structures – Masonry deterioration, Seismic retrofitting, introduction to health monitoring of structures.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours :60		
Programme Out come		Ability to analyse The distress structure and propose repair methodology						
Text Books								
1. Ransom,W.H., Building Failures, Tayloar & Francis, 2002. 2. Perkins.P, Repair, Protection and Waterproofing of Concrete Structures , CRC Press, 2002.								
Reference Books								
1. Ravindra.V, Jeffrey.G, Protection of Concrete, CRC Press, 2003. 2. Richardson,B.A., Remedial Treatment of Buildings, Butterworth-Heinemann, 1995. 3. Breyse.D, Non-Destructive Assessment of Concrete Structures: Reliability and Limits of Single and Combined Techniques, Springer Publishers, 2012.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E21	BRIDGE ENGINEERING	3	1	0	4	25	75	100
Objective (s)	1. To know the investigation of Bridges (2) to know the design of Bridge foundation (iii) To know the bridge loads (iv) to know the Bridge construction and maintenance							
UNIT –I	Introduction					Total Hours 9		
History and Development of Bridges, Classification of Bridges-Investigations for culverts and minor bridge, Investigations for major bridge – Topography, catchment, hydrology, Geotechnical aspects, Construction Resources – Design Flood Discharge-Methods, Linear waterway.								
UNIT – II	Bridge Foundation					Total Hours 9		
Choice of Foundation for piers and abutments –Types - relative suitability. Load on Foundation - Well foundation – types –Design well foundation – Scour Depth – Stability of well foundation - well sinking - methods – Tilt correction – Case studies								
UNIT –III	Loads on Bridge					Total Hours 9		
Loading standards for road and railway bridges- Setting out for piers and abutments, Minor Bridges and Culverts, Single span Bridge, Multispan Bridge, Major/Important Bridges.								
UNIT –IV	Construction of Bridges					Total Hours 9		
Bridge superstructure – supports and centering for RC bridges – erection process of RC girders and steel girder bridges .								
UNIT –V	Maintenance of Bridges					Total Hours 9		
Maintenance-Inspection of bridges, Maintenance of substructure girders-Load testing on bridges-Temporary and movable bridges- Re-building of bridges- bridge failure.								
Total Contact Hours : 15		Total Tutorials : 0		Total Practical Class : 45		Total Hours :60		
Programme Out come		At the end of the course, the student is able to select the type of bridge, design and its construction						
Text Books								
1. Ponnuswamy S, “Bridge Engineering” Tata McGraw Hill Publishing Co., 2013. 2. Rangwala.S.C, Rangwala.P.S, Rnagwala.K.S., Bridge Engineering, Charotar Books Publishers, 2013.								
Reference Books								
1. David Blockley, Bridges, Oxford University Press,2010. 2. Singh, V.P , Wells and Caissons, Nemchand & Brothers,1981. 3. Victor.D.J., Essentials of Bridge Engineering, Oxford IBH Publishers, 2013.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E22	<b>ADVANCED DESIGN OF STEEL STRUCTURES</b>	3	1	0	4	25	75	100
<b>Objective (s)</b>	1. To analyse the few important steel structures 2. To understand the codal provisions for design of various steel structures.							
<b>UNIT-I</b>	<b>Beam-Columns Joints</b>					Total Hours : 9		
Behaviour – torsional buckling in beam-columns- interaction under biaxial loading- design of beam-columns – design of eccentrically loaded base plates.								
<b>UNIT-II</b>	<b>Industrial Structures:</b>					Total Hours : 9		
Loads – wind load calculations - design of Trusses, knee braced trusses, design of braced and unbraced portal and gable portal frames including joints. Design of gantry girders, and gantry girder columns.								
<b>UNIT - III</b>	<b>Steel chimneys &amp; Towers</b>					Total Hours : 9		
Chimneys: loading and load combinations – design and stability considerations – design of base and foundations for chimneys. Towers: Analysis and design of lattice towers- transmission line towers- configurations- types-loads and load combinations- temperature effect-design principles.								
<b>UNIT – IV</b>	<b>Bridges</b>							
Design of Plate girder bridges – influence line diagram - IRC guidelines- effect of wind. Design of truss girder bridges- types of bearings and design of bearings.								
<b>UNIT - V</b>	<b>Fatigue resistant design</b>					Total Hours : 9		
Factors affecting fatigue life- fatigue assessment – fatigue analysis. Pre-Engineered Buildings: Advantages – design principles. Design in light gauge steel sections. Introduction to various software for design of steel structures.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours :60		
<b>Programme Out come</b>		1. At the end of this course the student is able to design the industrial steel structures.						
<b>Text Books</b>								
1. Shiyekar, M.R., Limit State Design in Structural Steel, Second Edition, PHI Learning Private Ltd., Delhi, 2013. 2. Shah, V.L., and Veena Gore, Limit State Design Of Steel Structures, Structures Publications, Pune, 2012.								
<b>Reference Books</b>								
1. Subramanian, P., Design of steel structures, Oxford Publishers, New Delhi, 2007 2. Bhavikatti, S.S., Design of Steel Structures, IK International Publishing House Pvt Ltd, New Delhi, 2014. 3. Sai Ram K.S., Design of Steel Structures, Pearson Education Ltd., 2013. 4. Virendra Gehlot, Ram Chandra, Design of steel structures, Vol.I & II, Standard Publishers, 2012								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E23	ENVIRONMENTAL IMPACT ASSESSMENT	4	0	0	4	25	75	100
Objective (s)	1. To have a knowledge on the impact of various developmental Projects on environment 2. To decide appropriate technologies to quantify the impact. 3. To have a knowledge on the various mitigation measures. 4. To prepare the BIS and EMP.							
UNIT - I		Laws and Acts			Total Hours 12			
Historical perspective of environmental protection laws and acts in India - Definition of EI, EIA, EIS - Industrial policy statement of the Government of India. Legal and Regulatory aspects in India - Types and Limitations of EIA - Minimum National Standards – Bureau of Indian Standards - WHO standards.								
UNIT - II		Methodologies			Total Hours 12			
EIA methodologies – Appropriate Methodologies, Quantification, - Cost benefit analysis - Risk assessment, Test Model format - Preliminary assessment								
UNIT - III		Air quality impact			Total Hours - 12			
Background - Typical considerations and factors, air quality impact of industry, transport systems, mitigation methods. Water quality impact: Water quality criteria and standards, Field Surveys water quality- impacts by developmental projects –Land and soil quality impacts- Soil fertility and remediation. Noise impact: Noise and sound, the effects of noise on people, noise scales and rating methods, estimating transportation noise impact.								
UNIT - IV		Energy Impact			Total Hours 12			
Energy impact considerations, data sources, energy conservation data, EIA of hydro, thermal and nuclear power plants, Vegetation and Wild life impact: Biological concepts and terms, impact on flora and fauna, mitigating measures, alternatives - Types, steps in performing socio economic impact assessment, analysis of public services and facilities, impacts, social impacts								
UNIT - V		Summarization of environmental impacts			Total Hours 12			
Environmental Management plan, Public involvement - impacts of economic profile of the community, Exchange of information - comparison of alternatives-Training								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours :60		
Programme Out come		1. An ability to indentify and quantitfy the impacts due to various projects on environment and plan mitigation measures; to safeguard the environment.						
Text Books								
1. Trivedi.P.R, Trivedi, P.R, Environmental Impact Assessment, APH Publishing, 2011.								
Reference Books								
1. Canter, L.W., Environmental Impact Assessment, Mc Graw Hill, 1996. 2. Petts, J., Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, London, 1999. 3. Environmental assessment of development projects, United Nations Asia and Pacific Development Centre, Kuala Lampur, 1983. 4. John, G. Rau and David C. Wooten (Ed), Environmental Impact Analysis Hand Book, McGraw Hill Book Co., 1980.								

## HS E24 ENGINEERING ECONOMICS

Department : Civil Engineering				Programme : B. Tech. Civil Engineering				
ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
HS EE24	ENGINEERING ECONOMICS	4	0	0	4	25	75	100
Objective (s)								
UNIT – I	Introduction to Economics					Total Hours : 12		
Flow in an Economy, Law of Supply and Demand, Concept of Engineering Economics - Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of Costs, Marginal Cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-Even Analysis, P/V ratio, Elementary Economics Analysis- Material selection for product, Design selection for a product, Building material selection, Process Planning,								
UNIT – II	Value Engineering					Total Hours : 12		
Make or Buy Decision, Value Engineering-Function, Aims, Value Engineering procedure, Interest Formulas and their Applications - Time Value of Money, Single Payment Compound Amount Factor, Single Payment Present Worth Factor, Equal Payment Series Compound Amount Factor, Equal Payment, Series Sinking Fund Factor, Equal Payment Series Present Worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate, Examples in all the methods.								
UNIT – III	Cash Flow Diagram					Total Hours : 12		
Methods of Comparison of Alternatives- Present Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method, Examples in all the methods								
UNIT – VI	Replacement and Maintenance Analysis					Total Hours : 12		
Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, Replacement of an Asset with a New Asset - Capital Recovery with Return and Concept of Challenger and Defender, Simple Probabilistic Model for items which fail Completely.								
UNIT – V	Depreciation					Total Hours : 12		
Introduction, Straight Line Method of Depreciation, Declining Balance, Method of Depreciation, Sum-of-the-Years-Digits Method of Depreciation, Sinking Fund Method of Depreciation/Annuity Method of Depreciation, Service Output Method of Depreciation, Evaluation of Public Alternatives-Introduction, Examples, Inflation Adjusted Decisions- Procedure to Adjust Inflation, Examples on comparison of alternatives and Determination of Economics Life of asset.								
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0		Total Hours : 60		
Programme Outcome								
Text Books								
1. Pannerselvam, R., Engineering Economics, Prentice-Hall of India Pvt. Ltd., 2013. 2. Pravin.K, Fundamentals of Engineering Economics, Wiley India (P) Ltd., 2012.								
Reference Books								
1. Degarmo, E.P., Sullivan, W.G. and Canada, J.R.. Engineering Economy, Macmillan, 1984. 2. Grant, E.L., Ireson, W.G. and Leavenworth, R.S., Principles of Engineering Economy, Ronald Press,1976. 3. Smith G.W. En :'Engineering Economics, Iowa State Press, Iowa, 1973								



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ELECTIVE SUBJECT								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E25	DESIGN AND CONSTRUCTION OF PREFABRICATED STRUCTURES	3	1	0	4	25	75	100
Objectives	1. To familiarize the design of basic elements in precast construction. 2. To familiarize the students with various prefabrication construction techniques adopted in practice.							
UNIT -I	Materials in Precast Structures				Total Hours : 9			
Materials, admixtures, pigments - Modular co-ordination, standardization and tolerances-system of pre-fabrication. Pre-cast concrete manufacturing techniques, Moulds –construction design, maintenance and repair.								
UNIT -II	Precast Construction Techniques				Total Hours : 9			
Pre-casting techniques - Planning, analysis and design considerations - Handling techniques -Transportation Storage and erection of structures. Curing techniques including accelerated curing such as steam curing, hot air blowing, etc								
UNIT -III	Precast concrete floors and beams				Total Hours : 9			
Simplified frame analysis, Precast concrete flooring options, flooring arrangements, structural design of individual units, design of composite floors, Composite and non-composite reinforced beams								
UNIT -IV	Precast concrete columns and connections				Total Hours : 9			
Precast concrete columns and their design. Basic mechanism of joints and connections, compression joints, shear joints, tension joints. Connections-pin jointed and moment resisting connections.								
UNIT -V	Application of Prefabricated structures				Total Hours : 9			
Pre-cast and pre-fabricating technology for low cost and mass housing schemes. Small pre-cast products like door frames, shutters, Ferro-cement in housing - Water tank service core unit.								
Total Contact Hours: 45		Total Tutorials : 15		Total Practical Classes: 0		Total Hours : 60		
Programme Outcome		Student should able to design precast elements and be able to execute the construction sequence in a project with precast elements.						
Text Books								
1. Levitt. M., Precast concrete - Materials, Manufacture Properties and Usage, Applied Science Publs. 2007, 2. Konex.T., Handbook of Pre-cast Construction, Vol.1.2&3. 3. Kim S Elliott, Precast Concrete Structures, Butterworth Heinemann Publishers, 2002.								
Reference Books								
1. Richardson,J.G., Pre-cast concrete Production, Cement and Concrete Association, London, 1973. 2. Madhava Rao.A-G., Modern Trends in Housing in Developing Countries, Oxford & UBH Publishing co., 1985. 3. Lewicki.B., Building with Large Pre-fabrications, Elsevier Publishers								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E26	<b>EARTHQUAKE RESISTANT DESIGN OF STRUCTURES</b>	3	1	0	4	25	75	100
<b>Objective(s)</b>	1. To study the effect of earthquake loading on the behaviour of structures. 2. To provide a basic understanding of Engineering seismology and dynamics of structures. 3. To learn the provisions in the IS codes for earthquake resistant design of structures.							
<b>UNIT - I</b>	<b>Elements of Engineering Seismology</b>					Total Hours : 9		
Elements of engineering seismology - characteristics of earthquake- earthquake size- plate tectonics – types of seismic waves – seismographs - effect of earthquake - earthquake history- seismicity of India.								
<b>UNIT - II</b>	<b>Theory of Vibrations</b>					Total Hours : 9		
Theory of vibrations - formulation of equation of motion- single degree of freedom system- free and forced vibrations - damped and undamped vibrations - Basic introduction to multiple degree of freedom systems.								
<b>UNIT – III</b>	<b>Structural Systems</b>					Total Hours : 9		
Performance of structures under past earthquakes- lessons learnt from past earthquakes– soil liquefaction - Principles of earthquake resistant design - Structural system requirements of buildings – Plan and vertical irregularities .								
<b>UNIT -IV</b>	<b>Introduction to IS Codes</b>					Total Hours : 9		
Behaviour of reinforced concrete and steel elements under cyclic loading –Confinement- ductility and energy dissipation- Introduction to Indian Standard Codes -IS:4326 – 1993 and IS13920-1993.								
<b>UNIT - V</b>	<b>Computation of Design lateral loads</b>					Total Hours :9		
Design of RC frames for earthquake loads – equivalent static force procedure as per IS 1893 – 2002 – Load combinations - Design of beams and columns for earthquake resistance.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours :60		
Programme outcome		Students are expected to compute design lateral loads for seismic analysis and to adopt detailing of reinforcement in accordance with codal provisions.						
<b>Text Books</b>								
1. Pankaj Agrarwal & Manish Shrikhande “Earthquake resistant Design of Structures” Prentice Hall of India Pvt Ltd. New Delhi, 2013 2. Duggal.S.K. Earthquake Resistant Design of Structures, Oxford University Press, 2014.								
<b>Reference Books</b>								
1. Leigh.W., Mario Paz. “Structural Dynamics – Theory & Computations”, Springer Verlag, 2010. 2. A K.Chopra, “Dynamics of Structures Theory and Applications to Earthquake Engineering” Prentice Hall of India (P) Ltd., 2008. 3. Pauley T and Priestley M.J.N, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons, New York, 2012. 4. Stratta, J.L “Manual of seismic Design”, Pearson Education Ltd.,2004.								

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ELECTIVE SUBJECT								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E27	DESIGN OF INDUSTRIAL STRUCTURES	3	1	0	4	25	75	100
Objective (s)	(1) To understand the planning aspects of industrial structures. (2) To understand the design principles of industrial structures.							
UNIT - I						Total Hours : 9		
Classification of Industrial Structures - Layout requirements - lighting and Ventilation - protection against noise and vibration - fire safety - factories act.								
UNIT II						Total Hours : 9		
Roofing configuration – types of trusses - Beams and lattice trusses - Type of roof covering materials - purlins - detailed design.								
UNIT III						Total Hours : 9		
Silos and Bunkers - Shape of hopper for different materials - design of vertical sides - hopper bottom - stiffening girder - staging -design - Conveyors and supporting structures.								
UNIT IV						Total Hours : 9		
Gable frames of uniform cross sections - varying depth – pin-jointed knee bracings - design of joints - analysis by various methods.								
UNIT V						Total Hours : 9		
Design of pre-engineered structures – design examples.								
Total Contact Hours : 45		Total Tutorials : 15		Total Practical Class : 0		Total Hours :60		
Programme Out come		The students would become confident of design of practical industrial design problems.						
Reference Books								
1 Punmia .B.C., Jain A.K, Arun Kumar Jain ,”Comprehensive R C C Designs”, Laxmi Publications (P) Ltd., New Delhi, 2012.								
2. Lother, "Advance Design in Steel Structure", Prentice Hall, USA, 1980								
3. Salmon. C.G. and Johnson J.E. "Steel Structure - Design and Behaviour", Harper and Row - 1980								
4. Wiliam McGuire - "Steel Structures", Prentice Hall of India New Jersey, 1968								
5. Arya and Ajmani, "Design of Steel Structures" Nem Chand Bros, 2012.								

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ELECTIVE SUBJECT								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CE E28	<b>FORMWORK FOR CONCRETE STRUCTURES</b>	4	0	0	4	25	75	100
<b>Objectives</b>	1. To emphasis on the importance of formworks in construction industry. 2. To familiarize the students with various forms of formworks suitable for concrete structures.							
<b>UNIT -I</b>	<b>Formwork materials and design concepts</b>				Total Hours : 12			
Introduction, requirements, selection and classification of formworks. Formwork materials – Timber, Plywood, Plastic, steel and other materials. Form coatings and linings. Design Concepts-Loads on formwork- estimation of permissible stresses. Maximum Bending Moment, Shear Force, and Deflection								
<b>UNIT -II</b>	<b>Forms for footings, walls and columns</b>				Total Hours : 12			
Conventional Formwork for Foundation, Conventional Wall Formwork, Design illustrations. Conventional Column Formwork, Modular Column Formwork System, Disposable Column Formwork, All Metal Column Formwork, Achieving Formwork Economy in Column Construction, Design illustration for Column Form								
<b>UNIT -III</b>	<b>Slab and Beam Formwork</b>				Total Hours : 12			
Traditional Slab and Beam Formwork, Various Slab and Beam Formwork Solutions Offered, Achieving Economy in Slab Construction, Design of Slab and Beam Formwork, Illustration of Slab and Beam Formwork Design								
<b>UNIT -IV</b>	<b>Formwork for special structures</b>				Total Hours : 12			
Formwork for Shells, Domes, Overhead Water Tanks, Tunnel, Bridge formwork and flying formwork, Advantages and Limitations of Flying Forms, Slip forms Form failures-causes, Avoiding Formwork Failure								
<b>UNIT -V</b>	<b>Formwork Supports and Scaffold</b>				Total Hours : 12			
Shores/Props and Drop heads, Multi-Legged Shoring Towers, Design of Vertical Supports for Formwork, Classification of Scaffolds, Timber Scaffolds and Metal Scaffolds								
Total Contact Hours: 60		Total Tutorials : 0		Total Practical Classes: 0			Total Hours : 60	
<b>Programme Outcome</b>		Student will able to appreciate the pros and cons of various formworks and identify suitable formwork for specific purpose.						
<b>Text Books</b>								
1. K. N.Jha, “Formwork for Concrete Structures” Mc Graw Hill Education Pvt Ltd, New Delhi, 2012								
<b>Reference Books</b>								
1. Robert L Peurifoy and G D Oberlender, “Formwork for Concrete Structures” Mc Graw Hill, New York, 1995								

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ELECTIVE SUBJECT										
Course Code		Course Name		Hours / Week			Credit	Maximum Marks		
				L	T	P	C	IA	UE	Total
CE E29		DISASTER MITIGATION AND MANAGEMENT		4	0	0	4	25	75	100
Objective (s)		1. To provide students an exposure to disasters, their significance and types. 2. To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction 3. To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR) 4. To enhance awareness of institutional processes in the country and 5. To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity								
UNIT - I		Understanding disaster							Total Hours : 12	
Concept of disaster - Different approaches - Concept of Risk - Levels of disasters - Disaster phenomena and events ( <i>Global, national and regional</i> )										
UNIT - II		Hazards and Vulnerability							Total Hours : 12	
Natural and man-made hazards - response time, frequency and forewarning levels of different hazards- Characteristics and damage potential of natural hazards- hazard assessment- Dimensions of vulnerability factors- vulnerability assessment- Vulnerability and disaster risk- Vulnerabilities to flood and earthquake hazards.										
UNIT - III		Disaster Management Mechanism							Total Hours : 12	
Concepts of risk management and crisis management - Disaster management cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness- Planning for relief										
UNIT - IV		Capacity building & Coping with disaster							Total Hours : 12	
Capacity building-Concept- Structural and nonstructural measures- Capacity assessment; strengthening capacity for reducing risk - Counter disaster resources and their utility in disaster management- Legislative support at the state and national levels- Coping strategies- Industrial safety plan.										
UNIT - V		Planning for disaster management							Total Hours : 12	
Strategies for disaster management planning- Steps for formulating a disaster risk reduction plan- Disaster management Act and Policy in India- Organisational structure for disaster management in India- Preparation of state and district disaster management plans.										
Total Contact Hours : 60		Total Tutorials : 0		Total Practical Class : 0			Total Hours :60			
Programme Out come		At the end of this course, the students will be able to recognize the increasing vulnerability of the planet in general and India in particular to disasters. Also, would create a basis to work towards preparedness and also helps to develop a culture of safety and prevention								
Text Books										
1. Leelakrishna Rao.K, Siddhartha Gautam, Murthy.N.J, Disaster Mitigation, Vista International (P) Ltd., 2012. 2. Tilottama Senapati, Rajan Kumar Sahoo, Disaster Management & Mitigation, Dominant Publishers, 2014.										
Reference Books										
1. Abarquez I. & Murshed Z. Community Based Disaster Risk Management: Field Practitioner’s Handbook, ADPC, Bangkok, 2004. 2. Chakrabarty, U. K. Industrial Disaster Management and Emergency Response, Asian Books Pvt. Ltd., New Delhi 2007 3. Manual on Natural Disaster Management in India, NCDM, New Delhi, 2001.										

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ELECTIVE SUBJECT								
Course code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	IA	UE	Total
CEE 30	<b>IRRIGATION AND DRAINAGE ENGINEERING</b>	4	0	0	4	25	75	100
Objectives	1. To familiarize the students with various irrigation practices adopted 2. To identify the irrigation requirements of various crops and to design irrigation channels							
<b>UNIT -I</b>	<b>Types of Irrigation Systems</b>				Total Hours : 12			
Introduction: Need, advantages and disadvantages of Irrigation - Environmental effects - Types of Irrigation systems - Gravity irrigation, canals, Tanks, Wells and Irrigation galleries - Water lifts. Soil -water - plant relationship: Soil and its function - Physical properties of soil and their importance in relation to irrigation - Classes and availability of soil water - Movement of water in soils - Measurement of soil moisture - Crop growth and moisture relationship - Salt problems in soil and effect of salts on plant growth.								
<b>UNIT -II</b>	<b>Irrigation Water Requirement</b>				Total Hours : 12			
Evaporation, Evapo transpiration, Consumptive use and its estimation - Crop factor - Lysimeters - Effective rain fall and irrigation requirements - Water requirements of various crops - Duty of water - Quality of irrigation water.								
<b>UNIT -III</b>	<b>Methods of Irrigation</b>				Total Hours : 12			
Surface, subsurface and overhead methods - Check basin, border & furrow, Drip and sprinkler irrigation - Irrigation efficiency, Depth, Rate and frequency of irrigation - Irrigation schedule.								
<b>UNIT -IV</b>	<b>Design of Irrigation Channels</b>				Total Hours : 12			
Design of unlined and lined channels for irrigation - Location and design of canal regulation structures - Cross drainage structures - Measuring devices.								
<b>UNIT -V</b>	<b>Land Development and Management</b>				Total Hours : 12			
Land Development: Reclamation and management of saline & alkaline soils, water logging, Causes and remedial measures - Design, construction and maintenance of drainage systems. Irrigation Management: Management of irrigation system - water charge assessment and water use management.								
Total Contact Hours: 60		Total Tutorials : 0		Total Practical Classes: 0		Total Hours : 60		
<b>Programme Outcome</b>		Student should able to identify the suitable method of irrigation and water requirement for a given soil and crop. Students should also be able to design and manage irrigation systems.						
<b>Text Books</b>								
1. Basak.K.N, Irrigation Engineering, Tata Mc-Graw-Hill, 2013. 2. Sharma.R.K., and Sharma. T.K., Irrigation Engineering , S.Chand & Company Ltd, 2014.								
<b>Reference Books</b>								
1. Punmia B.C, Ashok Kumar Jain, Pande Bb Lal, Irrigation & Water Power Engineering, Lakshmi Publications, 2013. 2. Arora.,K.R., Irrigation Water Power & Water Resources Engineering, Standard Publishers, 2013. 3. Raghunath. H.M., Irrigation Engineering, Wiley India (P) Ltd., 2012. 4. Das, M.M, Saikia, M.S Irrigation and water power Engineering, PHI, Learning, (P) Ltd, New Delhi, 2009								