2017-2018

1.1.3 Average percentage of courses having focus on employability/ entrepreneurship/ skill development offered by the institution during the last five years (10)

Sl.No.	Programme Code	Programme name	Course name	Course code		Year of Introduction	Link to the
1	CE	CIVIL ENGINEERING	Technical English	115ENT01	Employability - This course will enhance the nuances of language skills where students can identify and rectify their errors in language.	2015-2016	
2	CE	CIVIL ENGINEERING	Engineering Mathematics	115MAT02	Employability-This course will help the students to model the real life problems	2015-2016	
3	CE	CIVIL ENGINEERING	Engineering Graphics	115EGT05	Employability- The fundamentals and application of Engineering Graphics drive the students as an Engineer since drawing is the language of Engineers.	2015-2016	
4	CE	CIVIL ENGINEERING	Professional Communication	215ENT01	Employability - This course will help students develop their communication skills	2015-2016	
5	CE	CIVIL ENGINEERING	Integral Calculus and Complex Analysis	215MAT02	Employability-This course will help the students to model the real life problems	2015-2016	
6	CE	CIVIL ENGINEERING	Enginering Practice Lab	215EPP06	Skill Development- This course will make the students to practice with basic engineering practices like carpentry, welding foundry, electrical and electronics.	2015-2016	
7	CE	CIVIL ENGINEERING	Engineering Mathematics-III	315MAT01	Employability-This course will help the students to model the real life problems	2016-2017	
8	CE	CIVIL ENGINEERING	Applied Geology	315CET03	Employability -gain knowledge on the elementary concepts of Geology in Civil Engineering	2016-2017	
9	CE	CIVIL ENGINEERING	Mechanics of Solids	315CET04	Employability-gain knowledge on stress,strain and material properties used in construction industry	2016-2017	
10	CE	CIVIL ENGINEERING	Mechanics of Fluids	315CET05	Employability-gain knowledge in behaviour and design of hyrdualic structures	2016-2017	
10	CE	CIVIL ENGINEERING	Surveying - I	315CET06	Entrepreneurship/Skill Develoment - To possess the knowledge on Classification of Surveying.To impart knowledge on applications of levelling in Engineering field.	2016-2017	
10	CE	CIVIL ENGINEERING	Advanced Construction Techniques	315CEE01	Entrepreneurship - gain knowledge in various building materials and construction techniques	2016-2017	
10	CE	CIVIL ENGINEERING	Construction resource Planning & Management	315CEE02	Entrepreneurship - knowledge on Construction planning & scheduling helps in High profile construction companies	2016-2017	
10	CE	CIVIL ENGINEERING	Construction Planning & Orientation	315CEE03	Entrepreneurship - gain knowledge in project monitoring and controlling	2016-2017	
10	CE	CIVIL ENGINEERING	Building Materials & Construction Practice	315CEE04	Skill development -gain knowledge in testing of various building materials used in construction	2016-2017	
10	CE	CIVIL ENGINEERING	Surveying Practice - I	315CEP08	Entrepreneurship/Skill Develoment -gain knowledge in various surveying techniques and equipments whuich enhances employment opportunities	2016-2017	
10	CE	CIVIL ENGINEERING	Strength of Materials Laboratory	315CEP09	Skill Develoment-gain knowledgen in testing materials for strength	2016-2017	
10	CE	CIVIL ENGINEERING	Strength of Materials	415CET02	Employability-This course will help the students to model the real life problems	2016-2017	
10	CE	CIVIL ENGINEERING	Geotechnical Engineering	415CET03	Employability-gain knowledge on deformation and strains under different load action and response in terms of forces and moments	2016-2017	
10	CE	CIVIL ENGINEERING	Transportation Engineering - I	415CET04	Employability-to understand, soil as an engineering material the load- deformation behaviour, through its index and engineering properties	2016-2017	
10	CE	CIVIL ENGINEERING	Applied Hydraulic Engineering	415CET05	Employability-helps in planning and design of highway structures	2016-2017	
10	CE	CIVIL ENGINEERING	Hydrographic Surveying in detail	415CEE01	Employability- Concepts of fluid mechanics and applications to fluid machinery will enable the students to perform better as an engineer during their employability	2016-2017	
10	CE	CIVIL ENGINEERING	Aerial Surveying in detail	415CEE02	Skill Develoment - gain knowledge in various surveying techniques and equipments whuich enhances employment opportunities	2016-2017	
10	CE	CIVIL ENGINEERING	Lidar Surveying	415CEE03	Skill Develoment - gain knowledge in various surveying techniques and equipments whuich enhances employment opportunities	2016-2017	
10	CE	CIVIL ENGINEERING	Surveying - II	415CEE04	Skill Develoment - gain knowledge in various surveying techniques and equipments whuich enhances employment opportunities	2016-2017	
10	CE	CIVIL ENGINEERING	Photogrammetric Surveying & Image processing	415CEE05	Entrepreneurship/Skill Develoment -gain knowledge in various surveying techniques and equipments whuich enhances employment opportunities	2016-2017	
10	CE	CIVIL ENGINEERING	Building Planning and Drawing	415CEP07	Entrepreneurship/Skill Develoment - gain knowledge in various surveying techniques and equipments whuich enhances employment opportunities	2016-2017	
10	CE	CIVIL ENGINEERING	Hydraulic Engineering Laboratory	415CEP08	Skill Develoment- gain knowledge in preparing plan and building drawings	2016-2017	
10	CE	CIVIL ENGINEERING	Surveying Practice - II	415CEP09	Skill Develoment-gain knowledge on various hydraulic engineering problems like open channel flows and hydraulic machines	2016-2017	
10	CE	CIVIL ENGINEERING	Concrete Technology	515CET01	Employability- This course develops skills in concreting technology	2017-2018	
10	CE	CIVIL ENGINEERING	Structural Analysis - I	515CET02	Employability-gain basic knowledge on analysing structures	2017-2018	
10	CE	CIVIL ENGINEERING	Design of RCC Structures	515CET03	Skill Develoment-Design skill of RC memebers helps in design of safe and stable RC structures	2017-2018	
10	CE	CIVIL ENGINEERING	Water Supply Engineering	515CET04	Employability-gain knowledge in water supply system	2017-2018	

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10	CE	CIVIL ENGINEERING	Foundation Engineering	515CET05	Employability-suggest and design a suitable foundation for a structure depending on the type of soil. Also understand and analyze different types of earth pressure and perform stability checks for retaining wall	2017-2018
10	CE	CIVIL ENGINEERING	Water Shed Management	515CEE04	Employability - gain knowledge in modern techniques and manage storm water and flood	2017-2018
10	CE	CIVIL ENGINEERING	Geotechnical Engineering Laboratory	515CEP07	Skill Develoment - knowledge on soil tests and investigations helps in civil engineering projects	2017-2018
10	CE	CIVIL ENGINEERING	Public Health Engineering Laboratory	515CEP08	Skill Develoment - gain knowledge on water testing and environmental pollutants	2017-2018
10	CE	CIVIL ENGINEERING	Extensive Survey Camp (Two Weeks)	515CEP09	Entrepreneurship/Skill Develoment-through hands on training and applications on survey methods and equipments helps in employability opportunities as a surveyor	2017-2018
10	CE	CIVIL ENGINEERING	Structural Analysis - II	615CET01	Employability-gain knowledge in analysis of structures to find design forces	2017-2018
10	CE	CIVIL ENGINEERING	Design of Steel Structures	615CET02	Skill Develoment-Design of steel structures as per IS codes is essential for a civil engineer. He can design steel structures such as beams, columns, roof truss, gantry girder, etc.	2017-2018
10	CE	CIVIL ENGINEERING	Sanitary Engineering	615CET03	Employability-gain knowledge to design various unit operations and processes for sewage treatment system and hence can handle waste water disposal issues	2017-2018
10	CE	CIVIL ENGINEERING	Transportation Engineering - II	615CET04	Employability-gain skills to plan and design Railways , Airports and Harbour structures	2017-2018
10	CE	CIVIL ENGINEERING	Irrigation Engineering	615CET05	Employability-design skills for irrigation structures enhance their placement opportunities in the Civil consultancy offices	2017-2018
10	CE	CIVIL ENGINEERING	Advanced Concrete Technology	615CEE01	Entrepreneurship-To know the properties of different materials used for making special concrete	2017-2018
10	CE	CIVIL ENGINEERING	Pre-fabricated Structures	615CEE02	Entrepreneurship-Prefabricated structures is the innovative construction practice and useful for placements	2017-2018
10	CE	CIVIL ENGINEERING	Earthquake Resistant Structures	615CEE03	Employability-knowledge on earthquake resistant structures wil enhance job opportunities in Large scale earthaquake resistant projects	2017-2018
10	CE	CIVIL ENGINEERING	Design of PSC Structures	615CEE04	Skill Develoment-Knowledge of prestressed concrete structures helpful in large span bridge and building construction projects	2017-2018
10	CE	CIVIL ENGINEERING	Smart Structures	615CEE05	Employability-Work with various types of Sensors used in smart structures	2017-2018
10	CE	CIVIL ENGINEERING	Concrete and Highway Laboratory	615CEP07	Skill Develoment-Find out the properties of cement,aggregate,bitumen,concrete.	2017-2018
10	CE	CIVIL ENGINEERING	Computer Aided Design - I	615CEP08	Entrepreneurship/Skill Develoment-gain knowledge on software used for drafting and it helps in employment opportunities	2017-2018
10	CE	CIVIL ENGINEERING	Irrigation Drawing	615CEP10	Skill Develoment- Design and draft the various components of the Tank. Design and draft the various irrigation impounding structures.	2017-2018
10	CE	CIVIL ENGINEERING	Environmental Engineering Drawing	615CEP11	Skill Develoment-gain knowledge on water testing and environmental pollutants	2017-2018
10	CE	CIVIL ENGINEERING	Steel Structural Drawing	615CEP12	Entrepreneurship/Skill Develoment -gain knowledge on software used for drafting and it helps in employment opportunities	2017-2018
10	CE	CIVIL ENGINEERING	Bridge Engineering Drawing	615CEP13	Skill Develoment-This course enhances the skill set in design of structural members in particular the desgin of members in a bridge	2017-2018
10	CE	CIVIL ENGINEERING	RCC Structural Drawing	615CEP14	Skill Develoment-gain knowledge on software used for drafting and it helps in employment opportunities	2017-2018
10	CE	CIVIL ENGINEERING	Irrigation Drawing	615CEP10	Entrepreneurship/Skill Develoment-gain knowledge on software used for drafting and it helps in employment opportunities	2017-2018
10	CE	CIVIL ENGINEERING	Environmental Engineering Drawing	615CEP11	Skill Develoment- Design and draft the various components of the Tank. Design and draft the various irrigation impounding structures.	2017-2018
10	CE	CIVIL ENGINEERING	Steel Structural Drawing	615CEP12	Skill Develoment-gain knowledge on water testing and environmental pollutants	2017-2018
10	CE	CIVIL ENGINEERING	Bridge Engineering Drawing	615CEP13	Entrepreneurship/Skill Develoment -gain knowledge on software used for drafting and it helps in employment opportunities	2017-2018
10	CE	CIVIL ENGINEERING	RCC Structural Drawing	615CEP14	Skill Develoment-This course enhances the skill set in design of structural members in particular the desgin of members in a bridge	2017-2018
10	CE	CIVIL ENGINEERING	Construction Management	711CET01	Skill Develoment-gain knowledge on software used for drafting and it helps in employment opportunities	2014-2015
10	CE	CIVIL ENGINEERING	Estimation and Quantity Surveying	711CET02	Entrepreneurship/Skill Develoment-Knowledge in cost estimation and valuation enhances the job opportunity in the construction field	2014-2015
10	CE	CIVIL ENGINEERING	Remote Sensing & GIS	711CET03	Employability-gain knowledge on different types types of remote sensing platforms and sensors	2014-2015
10	CE	CIVIL ENGINEERING	Concrete Technology & Pre-stressed Concrete	711CET04	Employability- This course develops skills in concreting technology	2014-2015

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10	CE	CIVIL ENGINEERING	Repair and Rehabilitation of Structures	711CEE07	Entrepreneurship-knowledge on repair and rehabilitation of structures will enhance the jobs related to civil consultancy services	2014-2015
10	CE	CIVIL ENGINEERING	Instrumentation for Civil Engineers	711CEE10	Entrepreneurship - gain knowledge about measuring techniques in smart structures.	2014-2015
10	CE	CIVIL ENGINEERING	Computer Aided Design Laboratory – II	711CEP07	Entrepreneurship/Skill Develoment-gain knowledge on software used for drafting and it helps in employment opportunities	2014-2015
10	CE	CIVIL ENGINEERING	Concrete & Highway Materials Laboratory	711CEP08	Skill Develoment-find the mechanical properties of concrete and assess the quality of bitumen through laboratory tests.	2014-2015
10	CE	CIVIL ENGINEERING	Mini Project	711CEP09	Entrepreneurship/Skill Develoment- Students develop their skills in doing research or desgin and enchance their technical report writing and presentation	2014-2015
10	CE	CIVIL ENGINEERING	Bridge Engineering	811CET01	Skill Develoment-This course enhances the skill set in design of structural members in particular the desgin of members in a bridge	2014-2015
10	CE	CIVIL ENGINEERING	Valuation of Real Properties	811CET02	Entrepreneurship - analyse the valuation of residential, commercial and industrial buildings. Also gain comprehensive knowledge related to the investment of finance in real properties	2014-2015
10	CE	CIVIL ENGINEERING	Reinforced Earth and Earth Retaining Structures	811CEE02	skill development - design skill on masonry and RC structures is an important skill for a civil Engineer	2014-2015
10	CE	CIVIL ENGINEERING	Ground Water Engineering	811CEE05	Employability - Enhance the knowledge on well characteristics and groundwater exploration.	2014-2015
10	CE	CIVIL ENGINEERING	Skill Development Laboratory	811CEP05	Entrepreneurship/ Skill Development - gain field knowledge in vrious Civil Engineering subjects	2014-2015
10	CE	CIVIL ENGINEERING	Project Work	811CEP06	Entrepreneurship/ Skill Development - This course supports the students to undertake recent research works through inhouse project or internship mode to create an employability	2014-2015

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Department CIVIL ENGINEERING **Programme** B.E CIVIL **Regulation** 2015

Semester I

Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	Total
115ENT01	TECHNICAL ENGLISH -I	3	0	0	3	50	50	100

Prerequisite Nil

Course Objectives

At the end of the course ,the students should be able to:

- To facilitate students widen proper listening skills for academic andprofessional purposes.
- To inculcate and develop strategies to understand and to increase students' efficiencyin their academic and general reading.
- To train the students in the techniques of acquiring the ability to speak effectivelyin English with received pronunciation in real-life situations.
- To strengthen students' vocabulary power.
- To familiarize students with different functions of technical and scientific English.

UNIT I 9

General Vocabulary – definition, synonyms - antonyms – parts of speech – nouns, pronouns, verbs, adjectives,adverbs, articles, preposition & conjunction, - prefixes & suffixes - reading - skimming and scanning – writing -formal letter writing – complaint letter relating to business - general essay writing – listening and practicing shortspeeches.SuggestedActivities:Matchingwords&meanings-usingwordsincontext–makingsentences,changing words from one form to other forms - nouns - adjectives, -verb- adverb, same words as different parts of speech,intensifiers, articles, prepositions, parallelism, word building with prefixes & suffixes - identifying the rightusage of tenses, reading comprehension–skimming - scanning - cloze exercises, essay writing argumentativeessays, letter to the editor / business concerns

UNIT II 9

Jumbledwords-verbalanalogy-singlesentencedefinition–onewordsubstitute-typesofsentences,determiners, demonstratives - tenses - active and passive voice - reading for understanding contextual meaning – formal letterwriting – permission letter – descriptive essay writing - listening and practicing short presentations. Suggestedactivities: Jumbled words - verbal analogy - expanding a word - nominal compound (noun + noun), numericaladjectives-tagquestions-gapfillingexerciseswithsuitabletenseforms,transformationofsentencesfromactive to passive voice & vice versa, permission letter - asking permission for Industrial visit/In – plant training, reading comprehension - identifying key points ofatext - essay writing – descriptive type

UNIT III 9

Compound nouns – abbreviations and acronyms - editing - intensive reading - formal letter writing - transfer of information from graphical to written – transcoding - listening and transfer of information – paragraph writing - (cause and effect – compare and contrast) Suggested Activities: Singular and plural of nouns, exercises - compound nouns, connecting sentences with apt conjunctions - common errorexercise, making reading comprehension, requisition (OD)/acceptance/declining letter, writing conclusive ideas convincingly, pie charts and tables, exercises using questions – asking & answering questions, listening guided note-taking - writing paragraphs using notes

UNIT IV 9

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Semester I

Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	Total
115MAT02	ENGINEERING MATHEMATICS - I	3	0	1	4	50	50	100

Prerequisite Nil

Course Objectives

At the end of the course ,the students should be able to:

- To understand the eigen value problems.
- To solve differential equations of certain types, including systems of differentialequations that they might encounter in the same or higher semesters.
- To understand the concepts of curvatures, evolutes and envelopes and to study themaxima and minima of any function.
- To learn the partial derivations and apply the same to find maxima and minima.
- To understand various methods to solve the partial differential equations

UNIT I MATRICES **9+3**

Eigen values and eigen vectors of a real symmetric matrix –Properties – Cayley - Hamilton theorem (Statementonly) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form– Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS **9+3**

Higher order linear differential equations with constant coefficients – Method of variationofparameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients-Applications to Engineering problems-Electric Circuits, Simple Harmonic Motions and bending of beams.

UNIT III DIFFERENTIAL CALCULUS **9+3**

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolutes as envelope of normals.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES **9+3**

Partialderivatives–Euler'stheoremforhomogenousfunctions–Totalderivatives– Jacobians– Taylor's expansion– Maxima and Minima – Method of Lagrangian multipliers.

UNIT V PARTIAL DIFFERENTIAL EQUATIONS **9+3**

Solutions of first order partial differential equations – Standard types – Singular solutions - Lagrange's Linear equation – Solution of homogeneous and non-homogenous linear equations of second and higher order with constant coefficients.

Total Hours **45+15**

Course Outcomes

Upon Completion of this course, students will be able to :
CO1: Write, test, and debug simple Python programs.
CO2: Implement Python programs with conditionals and loops.
CO3: Develop Python programs step-wise by defining functions and calling them.C04: Use Python lists, tuples, dictionaries for representing compound data.
CO5: Read and write data from/to files in Python and engineeringproblems.

Text Books

Modal verbs and probability – concord – phrasal verbs - cause and effect expressions – extended definition –transferofinformation–readingcomprehension-contrastingandcomparativeessays–checklist–creatingblogs – e-mail writing Suggested activities: Making sentences using modal verbsto express probability, gap filling using relevant grammatical form of words, identifying the meaning ofphrasal verbs, connecting sentences showing cause and effect relationship, flow charts and bar diagrams, readingcomprehension, check list, extempore and paragraph writing (analytical and narrative)

UNIT V **9**

'If'conditionals–gerunds–idiomsandphrases–punctuation-intensivereading–listening-formalletterwriting – invitationletter—errorcorrection-writinginstructionsandrecommendations–speaking - short presentations on topics (technical andnon-technical)Suggested activities: Sentence completion exercises using 'if' conditionals, correcting sentences (punctuation), essay writing, writing instructions and recommendations, role play, discussion, debating, discussing, etc..

Total Hours 45

Course Outcomes

Upon Completion of this course, students will be able to :
CO1: Write, test, and debug simple Python programs.
CO2: Implement Python programs with conditionals and loops.
CO3: Develop Python programs step-wise by defining functions and calling them.CO4: Use Python lists, tuples, dictionaries for representing compound data.
CO5: Read and write data from/to files in Python ability to carry out extempore discussions, document and elucidateideas.

Text Books

1 A.Edwin Jeevaraj & Priya Philip, "Technical English", (with work book), Coimbatore, Sahana Publications, Coimbatore, 2011.

Reference Books

1 Department of English, Anna University. Mindscapes: English for Technologists and Engineers Orient Blackswan, Chennai. 2012
2 Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011
3 English for Engineers and Technologists "Combined Edition (Volumes 1 & 2)", Chennai: Orient Longman Pvt. Ltd., 2006. Themes 1 – 4 (Resources, Energy, Computer, Transport).
4 Andrea, J. Rutherford, "Basic Communication Skills for Technology", Second Edition, Pearson Education, 2007.
5 Extensive Reading: 1. A.P.J.Abdul Kalam with Arun Tiwari, "Wings of Fire" An Autobiography, University Press (India) Pvt. Ltd.,1999, 30th Impression 2007.

Note: The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

Course Code	Course name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
115ENT01	TECHNICAL ENGLISH-I	CO1	2		1		2		2		1		1	2	1	2	2
		CO2		1	2	1	3	1		1	2	2		1	3	1	1
		CO3		1	2	1		1	3	1	2	2	3	1		1	1
		CO4	2		1		2		2		1		1	2	1	2	2
		CO5	2	3	1	3	2	3	2	3	1		1	2	1	2	2

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1 T.Veerarajan, "Engineering Mathematics " Tata McGraw-Hill Publishing company, New Delhi, (2014).
2 Grewal. B.S, "Higher Engineering Mathematics", Khanna Publications, Delhi, (2012).

Reference Books

1 Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, (2012
2 Kandasamy.P, Thilagavathy,K., &Gunavathi.K., "Engineering Mathematics for first year "., S.Chand & Company Ltd., New Delhi.(2013)
3 V.Prameelakaladharan and G.Balaji, "Engineering Mathematics-I", Amrutha marketing, Chennai. (2014).

Course Code	Course name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
115MAT02	ENGINEERING MATHEMATICS-I	CO1	2		1		2		2		1		1	2	1	2	2
		CO2		1	2	1		1		1	2	2	3	1	3	1	1
		CO3		1	2	1		1		1	2	2		1		1	1
		CO4	2		1		2		2		1		1	2	1	2	2
		CO5	2		1	3	2		2	3	1		1	2	1	2	2

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Semester I

Course Code	Course Name	Hours/Week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	Total
115EGT05	ENGINEERING GRAPHICS	3	0	0	3	50	50	100

Prerequisite NIL

Course Objectives

At the end of the course ,the students should be able to:

- The students will learn graphics skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.
- To understand the basic principles of technical / engineering drawing.
- To understand the different steps in producing drawings according to BISconvention.

Concepts and conventions (Not for Examination) 3

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING 9+6

Curves used in engineering practices:

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

Free hand sketching:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 9+6

Projectionofpointsandstraightlineslocatedinthefirstquadrant–Determinationoftruelengthsand true inclinations – Projection of polygonal surface and circular lamina inclined to both referenceplanes.

UNIT III PROJECTION OF SOLIDS 9+6

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 9+6

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane andperpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 9+3

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms,pyramids, cylinders and cones.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

Total Hours 45+27

Course Outcomes

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

CO1: The student will be able to perform free hand sketching of basic geometricalconstructions and multiple views ofobjects.

CO2: The student will be able to do orthographic projection of lines and plane surfaces. CO3: The student will be able to draw projections of solids, section of solid and developmentofsurfaces.

CO4: The student will be able to prepare isometric and perspective sections of simplesolids.

Text Books

1 G.Ranganath, Channankaiah and Halesh Koti, "Engineering Graphics", Second Edition, Sahana Publishers 2011

2 Bhatt. N.D., "Engineering Drawing" Charotar Publishing House, 46th Edition, 2003.

Reference Books

1 Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, 2008.

2 Gopalakrishnana. K. R, "Engineering Drawing" (Vol. I & II), Subhas Publications, 1998.

3 Natrajan K. V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2006.

Publication of Bureau of Indian Standards:

i. IS10711–2001:TechnicalproductsDocumentation–Sizeandlayoutofdrawingsheets.

ii. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation –Lettering.

iii. IS10714(Part20)–2001&SP46–2003:Linesfortechnicaldrawings.

iv. IS11669–1986&SP46–2003:DimensioningofTechnicalDrawings.

v. IS 15021 (Parts 1 to 4) – 2001: Technical drawings –ProjectionMethods.

Course Code	Course name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
115EGT05	ENGINEERING GRAPHICS	CO1		1	2	1		1	3	1	2	2		1	3	1	1
		CO2		1	2	1		1		1	2	2		1		1	1
		CO3	2		1		2		2		1		1	2	1	2	2

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215EPP08	ENGINEERING PRACTICES LABORATORY	0	0	3	2	50	50	100

Prerequisite Nil

Course Objectives

At the end of the course ,the students should be able to:

- To provide exposure to the students with various basic engineering practicesinmechanicalengineering
- To provide exposure to the students with basic electrical, electronics andcomputerengineeringpractices

LIST OF EXPERIMENTS

WELDING:

Study of electric Arc welding and Gas welding tools and equipments.

Preparation of Arc welding and Gas welding models :

i) Buttjoint ii) Lapjoint iii) T -joint.

FITTING:

Study of fitting tools and operations.

Preparation offittingmodels: i) V-fitting ii) Square fitting

SHEET METAL WORK:

Study of sheet metal tools and operations

Preparation of sheet metalmodels: i) Tray ii)Funnel

PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

Preparation ofplumbingmodels: Basic pipe connections with PVC and GI pipefittings.

CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

Preparation of carpentry models :

i)Lapjoint ii)Dovetailjoint iii) T-Joint

DEMONSTRATION ON:

ELECTRICAL ENGINNEERING PRACTICE

Study of Electrical components and equipment's

Residential house wiring using switches, fuse, indicator, lamp and energy meter.

ELECTRONICS ENGINNEERING PRACTICE

Study of Electronic components –Resistor, color coding, capacitors etc

Soldering practice – components soldering in simple electric circuit & testing continuity

COMPUTER HARDWARE AND SOFTWARE PRACTICE

Study of PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel,PowerPoint and Publisher.

Course Outcomes

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

CO1: Students will be able to prepare the pipe connections and identify the variouscomponents used inplumbing.

CO2: An ability to prepare simple wooden joints using wood workingtools. CO3: Anabilitytopreparesimplelap,buttandteejointsusingarcweldingequipments

CO4: Ability to demonstrate basic electrical electronic and computer components basedontheir physical parameters anddimensions.

Text Books

1 Ranganath. G, & Channankaiah, "Engineering Practices Laboratory Manual" S.S. publishers, 2014.

2 Jeyapoovan.T &, S Gowri "Engineering Practice Lab Manual" Vikas publishing house pvt.ltd, 2014.

References:

1 Ramesh Babu.V., "Engineering Practices Laboratory Manual", VRB Publishers Private Limited, Chennai, Revised Edition, 2014.

2 Bawa. H.S, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2009.

3 Kannaiah.P & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 2004.

4 Introduction to Computers, Peter Norton, 6/e Mc Graw Hill, 2006.

5 IT Essentials PC Hardware and Software Companion Guide,Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 2008.

Course code	Course name	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
215EPP08	ENGINEERING PRACTICES LAB	CO1	2		1		2		2		1		1	2
		CO2		1	2	1	3	1	3	1	2	2		1
		CO3		1	2	1		1		1	2	2		1
		CO4	2		1	3	2		2	3	1	3	1	2

Total Hours 45

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Semester - III								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315MAT01	ENGINEERING MATHEMATICS – III	3	2	0	4	50	50	100
OBJECTIVES	• To introduce Fourier series analysis this is central to many applications in engineering apart from its use in solving boundary value problems. • To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic. • To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes. • To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.							
UNIT-1	FOURIER SERIES				TOTAL HOURS	12 HOURS		
Dirichlet's conditions – General Fourier series – Change of scale - Odd and even functions – Half-range Sine and Cosine series – Parseval's identity – Harmonic Analysis – Complex form of Fourier series.								
UNIT-2	FOURIER TRANSFORM				TOTAL HOURS	12 HOURS		
Fourier integral theorem – Fourier transform pair - Sine and Cosine transforms – Properties – Fourier Transform of simple functions – Convolution theorem applications – Parseval's identity applications.								
UNIT-3	PARTIAL DIFFERENTIAL EQUATIONS				TOTAL HOURS	12 HOURS		
Formation – Solutions of first order equations – Standard types – Singular solutions - Lagrange's Linear equation – Solution of homogeneous and non-homogenous linear equations of second and higher order with constant coefficients.								
UNIT-4	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS				TOTAL HOURS	12 HOURS		
Classification of Partial Differential Equations – Method of separation of Variables – Solutions of one dimensional wave equation and One-dimensional heat equations –Applications using Fourier series solutions in Cartesian coordinates - Steady state solution of two-dimensional heat equation.								
UNIT-5	Z – TRANSFORM AND DIFFERENCE				TOTAL HOURS	12 HOURS		

	EQUATION		
Z – Transform - Elementary properties and applications - Inverse Z - transform – Convolution theorem (statement only) and applications - Initial and final value theorems - Solution of difference equations using Z - transform - Partial fractions method, Residue theorem method and Convolution theorem application.			
TOTAL HOURS TO BE TAUGHT			**60 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	Understanding the principle and to cultivate the art of formulating the physical problems in the language of mathematics.		
CO.2	Understanding the Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.		
CO.3	Understanding the Effective mathematical tools for the solution of partial differential equations. To develop Z-transform techniques which will perform the same task for discrete time systems as Laplace transform.		
TEXT BOOK:			
1.	**B.S.Grewal**, "*Higher Engineering Mathematics*", Khanna Publications (2007).		
REFERENCES			
1.	**T.Veerarajan**, *"Engineering Mathematics-III"*, Tata McGraw-Hill Publishing company, New Delhi, (2011).		
2.	**V.Prameelakaladharan, V.J.Sudhakar and G.Balaji**, *"Engineering Mathematics-III"* 1st Edition , Amrutha marketing, Chennai. (2010).		
3.	**P.Kandasamy, K.Thilagavathy, K.Gunavathy**," *Engineering Mathematics-III*", S.Chand Publishers.		

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Semester - III

Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315CET03	**APPLIED GEOLOGY**	**3**	**0**	**0**	**3**	**50**	**50**	**100**

OBJECTIVES

- To impart knowledge on strucutures & composition of geology.
- To impart knowledge on minerals and their properties.
- To impart knowledge on classification of rocks.
- To impart knowledge on structure of geology and its investigation.

UNIT-1 **GENERAL GEOLOGY** TOTAL HOURS 9 HOURS

Branches of geology – Earth Structures and composition – Elementary knowledge on continental drift and plate tectonics - Earth processes – Weathering – Work of rivers, wind and sea and their engineering importance – Earthquake belts – Seism tectonic Atlas of India - Groundwater – Mode of occurrence – prospecting – importance in civil engineering

UNIT-2 **MINERALOGY** TOTAL HOURS 9 HOURS

Crystallographic systems – physical properties – rock forming minerals – Quartz family. Feldpar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet – properties and engineering significance of clay minerals –Formation of ore minerals – Coal and petroleum.

UNIT-3 **PETROLOGY** TOTAL HOURS 9 HOURS

Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks. Description occurrence - Igneous rocks – Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks sandstone, Limestone, shale conglo, Conglomerate and breccia. Metamorphic rocks. Quartzite, Marble, Slate, Phyllite, Gneiss and Schist.

UNIT-4 **STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD** TOTAL HOURS 9 HOURS

Attitude of beds – Outcrops –Geological maps – study of structures – Folds, faults, joints and Lineaments– Their bearing on engineering construction. Seismic and Electrical methods of subsurface investigations

UNIT-5 **GEOLOGICAL INVESTIGATIONS** TOTAL HOURS 9 HOURS

Remote sensing techniques – Study of air photos and satellite images – Interpretation for Civil Engineering projects – Geological conditions necessary for construction of Dams, Tunnels, Buildings, Road cuttings, Landslides – Causes and preventions. Sea erosion and coastal protection

TOTAL HOURS TO BE TAUGHT **45 HOURS**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 The elementary concepts of Geology in Civil Engineering
CO.2 Mineralogy
CO.3 Distinction between Rocks
CO.4 Surface and sub-surface investigations of Civil Engineering practices

TEXTBOOKS:

1. Parbin Singh, **"*Engineering and General Geology*", Katson Publication House, 2008.**
2. **Krynine and Judd,** "*Engineering Geology and Geotechniques*", McGraw-Hill Book,2003

REFERENCES:

1. **Legeet**, "*Geology and Engineering*", McGraw-Hill Book Company 2008
2. Blyth, **"*Geology for Engineers*", ELBS, 2005**
3. **"*Seismotectonic Atlas of India*" www.ngri.org.in**

315CET03 Applied Geology																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO	PSO	PSO
CO 1	The elementary concepts of geology in civil engineering	1	-	-	2	1	1	2	-	-	-	-	-	1	-	1
CO 2	Mineralogy	1	-	-	1	1	2	1	-	-	-	-	-	1	-	1
CO 3	Distinction between Rocks	1	-	-	1	2	1	2	-	-	-	-	-	1	-	1
CO 4	Surface and subsurface investigations of Civil engineering Practices	1	-	-	1	2	1	2	-	-	-	-	-	1	-	1
CO 5	Geotechnical investigation	1	-	-	1	1	1	2	-	-	-	-	-	1	-	1

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Semester - III

Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315CET04	**MECHANICS OF SOLIDS**	**4**	**0**	**0**	**4**	**50**	**50**	**100**

OBJECTIVES The subject of Mechanics of Solids cuts broadly across all branches of engineering profession. At the end of this course, the student will have knowledge about behavior of members subjected to various types of forces. The subject can be mastered best by solving numerous problems.

UNIT-1 **STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS** TOTAL HOURS 12 HOURS

Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's law, limit of proportionately, modules of elasticity, stress-strain curve, lateral strain – temperature stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants – stress at a point – stress on inclined plane – principal stresses and principal planes – Mohr's circle of stresses.

UNIT-2 **TRANSVERSE LOADING ON BEAMS** TOTAL HOURS 12 HOURS

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Theory of simple bending – analysis of stresses – load carrying capacity of beams – proportioning of sections

UNIT-3 **DEFLECTION OF BEAMS AND SHEAR STRESSES** TOTAL HOURS 12 HOURS

Deflection of beams -Macaulay's method – slope and deflection using moment area method, Conjugate Beam method – variation of shear stress – shear stress distribution in rectangular, I sections, solid circular sections, hollow circular sections, angle and channel sections.

UNIT-4 **TORSION AND SPRINGS** TOTAL HOURS 12 HOURS

Stresses and deformation in circular (solid and hollow shafts) – stepped shafts –leaf springs – stresses in helical springs – deflection of springs.

UNIT-5 **THIN CYLINDERS / SHELLS, COMPLEX** TOTAL HOURS 12 HOURS

STATE OF STRESS.

Thin cylinders and shells under internal pressure – deformation of thin cylinders and shells, due to Fluid Pressure wire wound cylinders–stress on inclined plane, due to Bi-Axial Loading – principal stresses and principal planes – Mohr's circle of stresses.

TOTAL HOURS TO BE TAUGHT **60 HOURS**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Find the maximum values of the normal shearing stresses at a given point of a structure subjected to any loading combinations

CO.2 Determine the max values of the shear & bending moments in a beam & the corresponding shearing & bending stresses. This will provide them with the necessary pre-requisites for the design of beams and shafts for strength and stiffness consideration.

TEXT BOOKS:

1. *Strength of Material Vol-I*, **S. Bhavikatti** -Wiley Eastren Ltd, Bombay.
2. **V. N. Vazirani, M.M. Ratwani,** *Analysis of Structures, Volume – 1*, Khanna Publishers.

REFERENCES:

1. **Kazimi S.M.A,** *Solid Mechanics*, Tata McGraw-Hill Publishing Co, New Delhi, 2003.
2. **William Nash**, *Theory and Problems of Strength of Materials*, Schaum's Outline Series, McGraw-Hill International Edition.
3. *Strength of Materials* - Timoshenko and Young, Tata McGraw-Hill Publishing Co, New Delhi,

315CET04 Mechanics of Solids																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	able to find the maximum values of the normal shearing stresses at a given point of a structure subjected to any loading combinations.	3	3	3	3	2	2	1	3	2	2	2	1	3	2	3
CO2	able to determine the max values of the shear & bending moments in a beam & the corresponding shearing & bending stresses	3	3	2	3	2	2	3	2	2	3	2	1	3	2	2
CO3	able to determine the design of beams	3	2	3	3	2	3	2	2	3	2	2	1	3	2	1
CO4	Able to design of shafts for strength and stiffness consideration.	3	2	2	3	2	2	3	2	3	3	2	1	3	2	1
CO5	able to design of springs due to strain energy, deflection	3	3	2	3	2	3	3	2	2	3	2	1	3	3	2

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Adhiyamaan College of Engineering - Autonomous					Regulation		R-2015	
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Semester-III								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315CET05	**MECHANICS OF FLUIDS**	**4**	**0**	**0**	**4**	**50**	**50**	**100**
OBJECTIVES	The student is introduced to the definition and properties of fluids. Principles of fluid statics, kinematics and dynamics are dealt with subsequently. The applications of similitude and model study are covered subsequently. At the end of the course student shall be able to appreciate the importance of fluid mechanics and its application to real situations of fluid flow.							
UNIT-1	**DEFINATION AND FLUID PROPERTIES**				TOTAL HOURS		12 HOURS	
Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Pressure Measurements – manometers – Continum Concept of System and Control Volume.								
UNIT-2	**FLUID STATICS**				TOTAL HOURS		12 HOURS	
Pascal's Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre- Fluid mass under relative equilibrium.								
UNIT-3	**FLUID KINEMATICS**				TOTAL HOURS		12 HOURS	
Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets-Velocity Measurements- Pitot tube.								
UNIT-4	**FLUID DYNAMICS**				TOTAL HOURS		12 HOURS	

Euler and Bernoulli's equations – Application of Bernoulli's equation – Discharge measurement – Laminar flows through pipes and between plates - Turbulent flow – Hagen Poiseuille equation – Darcy-Weisbach formula – Major and minor losses of flow in pipes – Pipes in series and in parallel			
UNIT-5	**SIMILITUDE AND MODEL STUDY**	TOTAL HOURS	12 HOURS
Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models – Scale effect and distorted models.			
TOTAL HOURS TO BE TAUGHT			**60 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	Able to apply the concepts, principles of fluid statics and kinematics in real situations of fluid flow.		
CO.2	Able to apply the hydraulic principles in steady and unsteady flow condition in design problems .		
CO.3	Able to understand the pipe network systems.		
CO.4	Able to do the model studies in hydraulic engineering projects.		
TEXT BOOKS:			
1.	Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi		
2.	Garde, R.J. and Mirajgaoker, A.G., "Engineering Fluid Mechanics", Sci Tech Publications, 2011		
3.	Rajput, R.K., "A text book of Fluid Mechanics in SI Units", S.Chand Publications,2011		
4.	Fox, Robert, W. and Macdonald, Alan,T., "Introduction to Fluid Mechanics", John Wiley & Sons, 2011		
REFERENCES:			
1.	Streeter, Victor, L. and Wylie, Benjamin E., "Fluid Mechanics", McGraw-Hill Ltd., 2009.		
2.	E. John Finnemore and Joseph B. Franzini, "Fluid Mechanics with Engineering Applications", McGraw-Hill International Edition, 2001.		
3.	Bernard Massey, "Mechanics of Fluids" 7th Edition, CRC Press, Nelson Thornes Ltd. U. K. 2006.		

315CET05 Mechanics of Fluids																	
CO's		PO's												PSO's			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO 1	Recall the properties of fluids.	2		1									3	1			
CO 2	Compute the total pressure and centre of pressure for the various surfaces.	1		2									3	2	1		
CO 3	Apply the knowledge on the potential function, stream functions and Continuity equation	1	2	3										3	1		
CO 4	Estimate the design phenomena observed as flow in a pipes and plates	1	2	3									2	2	2	1	
CO 5	Formulate the dimensions of the models and similitude.	1	2	3								2		3	2	1	

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Semester-III								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315CET06	BUILDING MATERIALS & CONSTRUCTION PRACTICES	3	0	0	3	50	50	100
OBJECTIVES	• To impart knowledge on civil engineering materials and their properties. • To impart knowledge on modern materials. • To impart knowledge on foundation and form work. • To impart knowledge on super structure.							
UNIT-1	BUILDING MATERIALS				TOTAL HOURS	9 HOURS		
Stone as building material-Criteria for selection-Test on stones-Deterioration and preservation of stone works-Bricks-Manufacture of clay bricks-Test on bricks-Compressive strength- Water absorbtion-Efflorescence-Brick for special use- Refractory bricks-Cement and concrete hollow bricks-Lightweight concrete bricks-Lime-Preparation of lime mortar-Cement ingredients-Manufacturing process-Types of cement-Properties of cement and cement mortar + Concrete properties-Compressive strength-Tensile strength-Fly ash briks-aggregate- Codal provisions.								
UNIT-2	TIMBER AND OTHER MATERIALS				TOTAL HOURS	9 HOURS		
Timber -Market forms-Industrial timber-Plywood- Veneer- Thermo Cole- Panels of laminates-Steel-Aluminium and other metallic materials-Composition-uses-Market forms-Mechanical treatment- Paints-Varnishes-Distempers-Termite proofing- Codal provisions.								
UNIT-3	MODERN MATERIALS				TOTAL HOURS	9 HOURS		
Glass-Ceramics-Sealants for joints-Fibre glass reinforced plastic-Clay products-Refractories-Composite materials-Types-Application of laminar composites-Fibre textiles-Geosynthetics for civil engineering application								
UNIT-4	FOUNDATION AND FRAMEWORK				TOTAL HOURS	9 HOURS		
Introduction-function of foundation-Requirements of good foundation-Types of foundation-Deep foundation-Shallow foundation-Materials for frame work-Timber work-Plywood formwork-Order and method of removing formwork.								
UNIT-5	SUPERSTRUCTURE CONSTRUCTION				TOTAL HOURS	9 HOURS		

Masonry-Bricks-Stone-Types-Uses-Column-Beam-Lintels-Sunshade-Flooring-Plastering-R.C.C slab-One way and two way- Pitched roof and simple trusses-Construction joints-Expansion joints-Scaffoldings-arches-Doors & windows.	
TOTAL HOURS TO BE TAUGHT	**45 HOURS**
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	To know the properties of materials
CO.2	To know the conventional and modern construction
CO.3	To know the sub structure & frame work
CO.4	To know the super structure
TEXT BOOKS:	
1.	R.K. Rajput, Engineering materials, S.Chand & company Ltd.,2007.
2.	Rangwala.S.C., Building Construction, Charotar book stall, anand,2009
REFERENCES:	
1.	Punmia B.C., a Text Book of Building Construction, a Saurabh & co (p)Ltd., New Delhi, 2009.
2.	Frederick s.Merritt , a text book of building materials and construction practices McGraw-Hill Professional publication, 2001
3.	Civil Engineering Materials, Tichandigarhtata McGraw Hill, edition 2006.

315 CET06 Building Materials & Construction Practices																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To know the properties of materials.	1	-	-	2	-	1	1	-	-	-	-	-	1		1
CO2	To know the coenve ntional and modern construction	1	-	-	2	-	1	1	1	-	-	-	1	1	-	1
CO3	To know the sub structure & frame work	1	-	-	2	-	1	2	1	-	-	-	1	1	-	1
CO4	To know the super structure	1	-	-	1	-	1	1	2	-	-	-	1	1	-	1
CO5	To know timber and other materials	1	-	-	1	-	1	2	1	-	-	-	1	1	-	1

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Adhiyamaan College of Engineering - Autonomous					Regulation		R - 2015
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Semester - III							
Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA	TOTAL
315CET07	SURVEYING I	3	0	0	3	50	50	100
OBJECTIVES	To possess the knowledge on Classification of Surveying To impart knowledge on applications of levelling in Engineering field. To impart knowledge on uses of theodolite To impart knowledge on classification of engineering survey & setting out of curves							
UNIT-1	**INTRODUCTION AND CHAIN SURVEYING**				TOTAL HOURS		9 HOURS	
Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well conditioned triangles - Traversing - Plotting								
UNIT-2	**COMPASS SURVEYING**				TOTAL HOURS		9 HOURS	
Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors								
UNIT-3	**LEVELLING AND APPLICATIONS**				TOTAL HOURS		9 HOURS	
Level line - Levels and Staves - Bench marks - Temporary and permanent adjustments - Fly and check leveling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting								
UNIT-4	**THEODOLITE SURVEYING**				TOTAL HOURS		9 HOURS	
Theodolite - Temporary and permanent adjustments - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error								
UNIT-5	**ENGINEERING SURVEYS**				TOTAL HOURS		9 HOURS	

Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves	
TOTAL HOURS TO BE TAUGHT	**45 HOURS**
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	To understand the concept of chain surveying
CO.2	To learn the conversion system of bearing and their error adjustments
CO.3	To get knowledge on different types of levelling & its applications
CO.4	To understand the concept of Theodolite surveying, setting out of curves
TEXT BOOKS:	
1.	**Bannister A. and Raymond S.,** *Surveying,* ELBS, Sixth Edition, 2002.
2.	**KanetkarT.P.,** *Surveying and Levelling*, Vols. I and II, United Book Corporation, Pune, 2004.
REFERENCES:	
1.	**Clark D.,** *Plane and Geodetic Surveying*, Vols. I and II, C.B.S. Publishers and Distributors, Delhi.
2.	**James M.Anderson and Edward M.Mikhail,** *Introduction to Surveying*, McGraw-Hill Book Company,
3.	**Heribert Kahmen and Wolfgang Faig,** *Surveying,* Walter de Gruyter, 2005.
4.	**Punmia B.C.** *Surveying*, Vols. I, II and III, Laxmi Publications, 2009

315CET07 Surveying-I																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To understand the concept of chain surveying	2	1	1	1	2				3					2	1
CO2	To learn the conversion system of bearing and their error adjustments	1	2	1	2	1				3					1	2
CO3	To get knowledge on different types of levelling & its applications	2	2	1	1	2				3					2	1
CO4	To understand the Reconnaissance survey for route and engineering projects			3			1	1	2	2	1				1	3
CO5	To understand the concept of Theodolite surveying, setting out of curves	1	2	1	1	2				1					1	2

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Adhiyamaan College of Engineering - Autonomous						Regulation	R - 2015	
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Semester - III								
Course Code	Course Name		Hours/week			Credit	Maximum Marks	
			L	T	P	C	CA	EA
315CEP08	SURVEYING PRACTICE - I		0	0	3	2	50	50
OBJECTIVES	To impart knowledge on Chain & its classification. To impart knowledge on Levelling To impart knowledge on making contours in plains & hilly area To impart knowledge on Theodolite Surveying							
LIST OF EXPERIMENTS								
1.	Construction of regular polygons using chain and tape							
2.	Chain Traversing							
3.	Compass Traversing							
4.	Construction of polygon using prismatic compass and calculate area enclosed							
5.	Fly levelling using Dumpy level – Height of instrument and Rise and Fall method							
6.	Profile levelling using Dumpy level							
7.	Block levelling and contour							
8.	Measurement of horizontal angle by reiteration and repetition of vertical angles							
9.	Setting out Simple and compound curves by Theodolite							
COURSE OUTCOMES:								
After undergoing the course, the students will have ability to								
CO.1	Carry out survey work covering large area							
CO.2	Measure differences in elevation and distance accessible and inaccessible point							

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CO.3	Carry out alignment surveys and compute area / quantities
CO.4	Carry out setting out of curves by theodolite

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Semester - III								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
315CEP09	**STRENGTH OF MATERIALS LABORATORY**	**0**	**0**	**3**	**2**	**50**	**50**	**100**
OBJECTIVES	The experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, displacements and strains. Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.							
LIST OF EXPERIMENTS								
1. Determination of Compression Test on given specimen								
2. Determination of tension test on mild steel specimen								
3. Determination of Modulus of Rigidity of given specimen by conducting torsion test								
4. Determination of Modulus of rigidity of Helical spring								
5. Determination of Flexural Rigidity of given beam								
6. Determination of Double shear strength of given specimen								
7. Determination of Hardness of specimen by a. Brinell's Test b. Rock well hardness test								
8. Determination of Impact strength of specimen by a. Izod impact test b. Charpy Impact test.								
COURSE OUTCOMES:								
After undergoing the course, the students will have ability to								
CO.1	The compressive strength and split tensile strength of concrete							
CO.2	. The tensile strength of steel							
CO.3	The flexural behavior of beams like steel, wood, etc.,							
CO.4	The shear strength of steel							
CO.5	Hardness of materials							
CO.6	Impact resistance of materials							

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Department	Civil Engineering		Programme Code and Name			CE : B.E. Civil Engineering		
Semester - IV								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
415CET02	STRENGTH OF MATERIALS	3	2	0	4	50	50	100
OBJECTIVES	• To understand the strain energy principles and theorems with their applications • To understand the shear force and bending moment distribution for indeterminate beams • To impart the knowledge in calculating the capacity of column • To provide understanding of various methods in finding deflection of beams. • To exposure on thick cylinders and various theories of failure.							
UNIT-1	ENERGY PRINCIPLES				TOTAL HOURS		12 HOURS	
Strain energy and strain energy density – strain energy in traction shear, Flexure and torsion-Principle of virtual work-Castigliano's Theorems –application of energy theorems for computing deflections in beams and trusses – Maxwell's reciprocal theorems-Williot Mohr diagrams								
UNIT-2	PROPPED CANTILEVER AND FIXED BEAMS				TOTAL HOURS		12 HOURS	
Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) – Effect of Sinking of Supports in Fixed Beams- theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams for continuous beams (maximum two degrees of indeterminacy).								
UNIT-3	CONTINUOUS BEAMS				TOTAL HOURS		12 HOURS	
Continuous beams- theorem of three moments- analysis of continuous beams-Supports not at the same level-Continuous beams with a fixed end-S.F. and B.M. diagrams for continuous Beams-Slope and deflections in Continuous Beams (Qualities study only).								
UNIT-4	COLUMNS				TOTAL HOURS		12 HOURS	
Eccentrically loaded short columns – middle third rule – core section – columns of unsymmetrical sections (angle channel sections) – Euler's theory for long columns – critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns.								
UNIT-5	THICK CYLINDERS				TOTAL HOURS		12 HOURS	

Introduction-Lamys Theorem-Special Cases-Longitudinal and Shear stress- Design of Thick Cylinders Shells-Compound or Shrunk cylinder -Necessary difference of radii for shrinkage- Introduction to theories of failure – principal stress – principal strain – shear stress – strain energy and distortion energy theories.	
TOTAL HOURS TO BE TAUGHT	**60 HOURS**
TEXTBOOKS:	
1.	Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand& company Ltd., New Delhi, 2010.
2.	Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012
REFERENCES:	
1.	Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
2.	William A .Nash, "Theory and Problems of Strength of Materials", Schaum" s Outline Series, Tata McGraw Hill Publishing company, 2007.
3.	Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.
4.	Srinath, L.S, "Advanced mechanics and solids", Tata-McGraw Hill publishing company ltd, 2005.
5.	http://www.esm.psu.edu/courses/emch213d/tutorials/animations
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	apply energy principles in analysing structures
CO.2	analyse the indeterminate beams and their deflections which are required for designing structures
CO.3	analyse columns and to locate kern of column
CO.4	analyse thick cylinders subjected to fluid pressure
CO.5	apply theories of failure to calculate capacity of structure/system

415 CET01 Strength of Materials																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	apply energy principles in analysing structures	3	3	2	2	2	3	3	3	2	2	3	1	3	2	1
CO2	analyse the indeterminate beams and their deflections which are required for designing structures	3	3	2	2	2	3	3	3	2	2	3	1	3	2	2
CO3	analyse columns and to locate kern of column	3	3	3	2	2	3	3	2	3	2	2	1	3	2	2
CO4	analyse thick cylinders subjected to fluid pressure	3	3	3	2	3	3	2	2	2	2	2	1	3	2	3
CO5	apply theories of failure to calculate capacity of structure/system	3	3	3	2	2	2	3	3	3	3	2	1	3	2	2

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Semester-IV

Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
415CET03	**GEOTECHNICAL ENGINEERING**	**3**	**2**	**0**	**4**	**50**	**50**	**100**

OBJECTIVES

- To impart knowledge on engineering properties of soil
- To understand and appreciate subsurface flow patterns
- To characterize stress distribution in soil and acquire knowledge on shear strength parameters
- To have knowledge about testing methods of soil
- To understand slope failure mechanisms and protection measures

UNIT-1	INTRODUCTION	TOTAL HOURS	12 HOURS

Nature of Soil - soil phase relationships - Index properties - Sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification systems – Soil compaction - factors affecting compaction – field compaction methods and monitoring.

UNIT-2	SOIL WATER AND WATER FLOW	TOTAL HOURS	12 HOURS

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concept in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – quick sand condition - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problems.

UNIT-3	STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT	TOTAL HOURS	12 HOURS

Stress distribution in soil media – Boussinesque formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts –Westergaard equation for point load - Components of settlement – Immediate, secondary and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test – Field consolidation curve – NC and OC clays - problems on time and rate of consolidation.

UNIT-4	SHEAR STRENGTH	TOTAL HOURS	12 HOURS

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand.

UNIT-5	SLOPE STABILITY	TOTAL HOURS	12 HOURS

Slope failure mechanisms- Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - Stability analysis for purely cohesive and C-ϕ soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures & Soil Stabilization	
TOTAL HOURS TO BE TAUGHT	**60 HOURS**
TEXTBOOKS:	
1.	**Punmia B.C.**, "*Soil Mechanics and Foundation Engineering*", Laxmi Publications Pvt. Ltd., New Delhi, 2008
2.	**Gopal Ranjan and Rao A.S.R.,** "*Basic and applied soil mechanics*", New Age International Publishers, 2007
REFERENCES:	
1.	**McCarthy D.F.,** "*Essentials of Soil Mechanics and Foundations Basic Geotechniques*", Sixth Edition, Prentice-Hall, New Jersey, 2002.
2.	**Das, B.M,** "*Principles of Geotechnical Engineering*", (fifth edition), Thomas Books/ cole, 2002
3.	**Khan I.H.**, "*A text book of Geotechnical Engineering*", Prentice Hall of India, New Delhi, 2014.
4.	**C. Venkataramaiah,** "Geotechnical Engineering", New Age International Publishers, New Delhi, 2014.
5.	**Murthy, V.N.S.,** "Text Book of Soil Mechanics and Foundation Engineering", CBS Publishers, 2007.
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	classify the various types of soil
CO.2	determine the physical and engineering properties of soil
CO.3	determine the stresses in soils with respected to given loading conditions
CO.4	quantify the shear behaviour of soil
CO.5	derive the stability of slopes

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415CET03 Geotechnical Engineering																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Classify the various types of soil	1	2	3	2	3	2	2	3	1	3	1	3	3	2	1
CO2	Determine the physical and engineering properties of soil	2	3	1	3	1	2	2	3	2	1	3	2	2	3	2
CO3	The stresses in soils with respected to given loading conditions	3	2	2	3	1	1	2	2	3	2	3	2	1	1	3
CO4	Quantify the shear behavior of soil Check the stability of slopes	3	2	2	3	2	2	1	3	1	2	3	2	2	3	1
CO5	Student can evaluate the physical and mechanical properties of soil incentive and laboratory.	1	2	3	3	1	3	3	1	3	1	2	2	2	3	1

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Semester-IV								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
415CET04	SURVEYING II	3	0	0	3	50	50	100

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Semester-IV							
Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA	TOTAL
415CET05	**Transportation Engineering – I**	**3**	**0**	**0**	**3**	**50**	**50**	**100**

OBJECTIVES

- To study the concepts beyond planning and design highway.
- To acquire knowledge about methods of highway design and construction.
- To have knowledge on various materials and its testing methods of pavement construction.
- To understand causes of deterioration of highway and its maintenance methods.
- To estimate highway financing.

UNIT-1	HIGHWAY PLANNING AND ALIGNMENT	TOTAL HOURS	9 HOURS

Tresaguet and Macadam's method of Road Construction, Highway Development in India - Jayakar Committee Recommendations and Realisations- Twenty-year Road Development Plans- Concepts of On-going Highway Development Programmes at National Level- Institutions for Highway Development at National level - Indian Roads Congress- Highway Research Board- National Highway Authority of India- Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute-Requirements of Ideal Alignment-Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing-GIS and GPS techniques)Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way-Camber, Kerbs, Shoulders and Footpaths [IRC Standards]- Cross sections of different Class of Roads.

Tachometric 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.

UNIT-2	GEOMETRIC DESIGN OF HIGHWAYS	TOTAL HOURS	9 HOURS

Design of Horizontal Alignments – Super elevation-Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems]-Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients-Summit and Valley Curves-Sight Distances - Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD]-Geometric Design of Hill Roads [IRC Standards Only]

UNIT-3	DESIGN OF RIGID AND FLEXIBLE PAVEMENTS	TOTAL HOURS	9 HOURS

Rigid and Flexible Pavements, Air field pavements -Components and their Functions-Design Principles of Flexible and Rigid Pavements-Factors affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic-Design Practice for Flexible Pavements [CBR method, IRC Method and Recommendations- Problems]-Design Practice for Rigid Pavements – [IRC Recommendations-Problems] – Joints			
UNIT-4	HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE	**TOTAL HOURS**	**9 HOURS**
Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory)-Soil – California Bearing Ratio Test, Field Density Test Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value Test -Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]-Highway Drainage [IRC Recommendations]			
UNIT-5	HIGHWAY MAINTENANCE, ECONOMICS AND FINANCE	**TOTAL HOURS**	**9 HOURS**
Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments.-Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks -Spalling of joints and Mud Pumping – and Special Repairs-Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only]-Highway user benefits, VOC using Charts, Economic analysis by annual cost method, benefit cost ratio method, NPV and IRR method, Principles of Highway Financing			
TOTAL HOURS TO BE TAUGHT			**45 HOURS**
TEXT BOOKS:			
1.	Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2010.		
2.	L R Kadiyali, N B Lal," Principles and practice of highway engineering", Khanna Publications, 2005.		
REFERENCES:			
1.	IRC Standards (IRC 37 - 2001 & IRC 58 -2001)		
2.	Bureau of Indian Standards (BIS) Publications on Highway Materials		
3.	Specifications for Road and Bridges, MORTH (India)		
4.	Daniel J Findley, Bastian Schroeder, Christopher Cunningham & Tom Brown, "Highway Engineering: Planning, Design, and Operations", Butterworth-Heinemann, 2015.		
5.	Hay W.W., "Introduction to transportation Engineering", John Wiley & Sons, NY, 2012.		

COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	do geometric design of highways considering the IRC specifications
CO.2	do structural design of flexible and rigid pavements
CO.3	plan the road networks
CO.4	successfully lead and manage highway engineering projects
CO.5	perform economic analysis for highway management

415CET05 Transportation Engineering-I																
CO's		**PO's**												**PSO's**		
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	do geometric design of highways considering the IRC specifications	3	3	3	1	2	1	1	2	3	1	1	1	2	1	2
CO2	do structural design of flexible and rigid pavements	3	3	2	1	1	2	2	2	3	2	1	1	3	2	2
CO3	plan the road networks	3	3	2	2	2	2	1	3	3	2	1	1	3	2	2
CO4	successfully lead and manage highway engineering projects	3	3	3	3	2	3	3	3	3	2	2	1	3	3	2
CO5	perform economic analysis for highway management	3	3	3	2	2	3	3	2	3	3	2	1	3	2	2

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Semester-IV								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
415 CEEXX	**APPLIED HYDRAULIC ENGINEERING**	**3**	**0**	**0**	**3**	**50**	**50**	**100**
OBJECTIVES	• To learn the characteristics of open channel flow and its measurements • To study the concepts of uniform and non uniform flow in open channel • To derive most economical channel sections • To understand the concepts of momentum principles • To impart knowledge on working of pumps and turbines							
UNIT-1	**OPEN CHANNEL FLOW**				**TOTAL HOURS**		**9 HOURS**	
Open channel flow – Types and regimes of flow – Velocity distribution in open channel –Specific energy – Critical flow and its computation. Stream Flow Measurements –Measurement of Stage-Measurement of Velocity – Area - Velocity Method – Numerical on above.								
UNIT-2	**UNIFORM FLOW**				**TOTAL HOURS**		**9 HOURS**	
Uniform flow - Velocity measurement - Manning's and Chezy's formula - Determination of roughness coefficients - Determination of normal depth and velocity – Most economical sections - Non-erodible channels– Numerical on above								
UNIT-3	**VARIED FLOW**				**TOTAL HOURS**		**9 HOURS**	
Introduction to GVF,RVF,SVF-Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Hydraulic jump – Types – Energy dissipation –Spillways – Convergent flumes – Numerical on above.								
UNIT-4	**IMPULSE MOMENTUM PRINCIPLES & TURBINE**				**TOTAL HOURS**		**9 HOURS**	
Impulse momentum principles - Impact of Jets on plane and curved plates - Turbines - Classifications of Turbines, Impulse and reaction turbines, Performance characteristics curves for Turbines - Iso efficiency curve - Numerical on above.								

UNIT-5	PUMPS	TOTAL HOURS	9 HOURS
Pumps – Classifications of Pumps - Centrifugal Pump –Components of Centrifugal Pumps – Work done on Centrifugal pumps-Characteristic curves for Centrifugal pumps - Positive displacement pumps- Reciprocating pump and its components - slip- Indicator diagram and its variation - Air vessels – Numerical on above - Introduction to Multistage pumps, Jet Pump & Submersible Pump			
TOTAL HOURS TO BE TAUGHT			**45 HOURS**

TEXTBOOKS:

1.	**Subramanya K.**, "*Flow in Open channels*", Tata McGraw-Hill Publishing Company, 2005.
2.	**Kumar K.L.**, "*Engineering Fluid Mechanics*", Eurasia Publishing House (P) Ltd., New Delhi, 2010.

REFERENCES:

1.	**Modi P.N and Seth,** "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi. 2003
2.	**Ranga Raju, K.G.**, "*Flow through Open Channels*", Tata McGraw-Hill Publishing Company, 2013.
3.	**Rajesh Srivastava,** "Flow through open channels", Oxford University Press, New Delhi, 2008.
4.	**VenTe Chow,** "Open Channel Hydraulics", McGraw Hill, New York, 2009.
5.	**Jain A. K.** "Fluid Mechanics", Khanna Publishers 1995.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to	
CO.1	analyze the flow characteristic of open channel
CO.2	design the most economical channel section in irrigation channels
CO.3	design spillways
CO.4	develop pilot studies on hydraulic turbines
CO.5	select and design pumps for various flow

415CEE01 Applied Hydraulic Engineering

CO's	PO's												PSO's		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	analyze the flow characteristic of open channel	2	3	3	1	1	2	2	1	1	1	1	1	2	2	1
CO2	design the most economical channel section in irrigation channels	2	3	2	1	1	2	2	2	1	1	2	1	3	2	2
CO3	design spillways	2	3	2	2	1	2	2	1	2	1	1	1	2	2	2
CO4	develop pilot studies on hydraulic turbines	2	2	2	3	2	2	2	2	2	1	1	1	2	2	2
CO5	select and design pumps for various flow	2	2	3	2	2	2	2	2	1	2	1	2	2	2	2

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Semester – IV								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	
415CEP07	Building Planning & Drawing	0	0	3	2	50	50	
OBJECTIVES	• to draft manual building drawings such as Plan, elevation and sectional views • to draft manual building drawings in accordance with development and control rules • to draft manual building drawings satisfying orientation and functional requirements							

UNIT-I BONDS AND BRICK MASONRY

Conventional Signs-Conventional Symbols-Brick Masonry-English Bond-Brick Masonry-Flemish Bond Stone Masonry- Ashlar, Fine & Rubble

UNIT-II DOORS AND WINDOWS

Cavity Walls-At Head of Window Opening & Roof Level-Panelled Door-Glazed & Panelled Door-Hollow Core or Framed Flushed Door-Panelled Window-Glazed Window

UNIT-III TRUSSES AND STAIR CASE

King Post Truss-Details of King Post Truss-Queen Post Truss-Steel Roof Truss-Lean TO Roof- Stair Case- Quarter Turn-Half Turn –Dog Legged Stairs-Half Turn (Open Well) Stairs.

UNIT-IV ELEMENTARY BUILDING PLANNING AND DRAWING

Foundations-Plan-Section-Elevation of a Single Roomed and Double Roomed Building

UNIT-V PLANNING AND DRAWING OF PUBLIC BUILDING

Foundations-Plan-Section-Elevation of a Public Building (School / Hospital / Concert)

QUESTION PAPER PATTERN

1 question each shall be answered from part A and part B

- Part A – Units I, II, III (two question be set)
- Part B – Units IV, V (two question be set)

REFERENCES:

1. Building drawing – Shah. M.G., Tata McGraw-Hill,2008
2. Building planning & Drawing –Kumaraswamy N., Kameswara Rao A., Charotar Publishing, 2013
3. Building Drawing with integrated approach to built environment - Shah, Kale and Patki, Tata McGraw-Hill, 2007
4. Building Planning and Drawing - S. S. Bhavikatti, M. V. Chitawa, I.K Iternational Publishing Ltd, 2014

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

- design and draft the various types of bonds, doors and windows
- design and draft foundations and staircases
- design and draft different types of trusses
- design and draft a residential building
- design and draft a public building

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Semester – IV

Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA
415CEP08	**HYDRAULIC ENGINEERING LABORATORY**	**0**	**0**	**3**	**2**	**50**	**50**

OBJECTIVES

- To impart knowledge on measuring flow through pipes and open channels
- To familiarize the determination of major and minor losses in pipes
- To get exposed to flow tests
- To acquire knowledge on finding the efficiency of various types of pumps
- To provide knowledge on various types of turbines and their applications

LIST OF EXPERIMENTS

1. Determination of hydraulic co-efficient for orifice piece
2. Determination of hydraulic co-efficient for mouth piece
3. Determination of co-efficient of discharge for notches
4. Determination of co-efficient of discharge for venturimeter
5. Hydraulic co-efficient of V notch orifice
6. Hydraulic co-efficient of Rectangular orifice
7. Hydraulic co-efficient of Triangular orifice
8. Study of impact of jet on flat normal plate
9. Study of impact of jet on flat inclined plate
10. Study of major and minor losses in pipes
11. Study on performance characteristics of Pelton turbine.
12. Study on performance characteristics of Francis turbine
13. Study on performance characteristics of Kaplan turbine
14. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
15. Study on performance characteristics of reciprocating pump.

COURSE OUTCOMES:

After completing the course, the students will have the ability to

- estimate the velocity and discharge in fluid flow experiments
- determine the minor losses in pipes
- determine the major losses in pipes
- design the components of the open channel based on velocity and discharge
- draw performance characteristics for turbine and pumps

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Semester – IV							
Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA
415CEP09	**SURVEYING PRACTICE- II**	**0**	**0**	**3**	**2**	**50**	**50**
OBJECTIVES	• To measure the angles and distances using total station • To get practical exposure to different systems of Tacheometry. • To set out a curve by different methods. • To determine the azimuth of a line by observation of sun. • To give exposure on modern surveying instruments like GPS and Total statio						

LIST OF EXPERIMENTS	
1.	Study of Total Station
2.	Heights and distances - Triangulation - Single plane method.
3.	Tacheometry - Tangential system - Stadia system - Subtense system.
4.	Total Station – Measurement of distance and angle
5.	Construct three point Traversing by using total station
6.	Topography survey by using total station
7.	To conduct the profile Levelling with total station
8.	To determine the area of given polygon / building by total station.
9.	To determine the vertical height of the building by total station.
10.	To plot the area with contour by total station.
11.	To construct the polygon by GPS survey
12.	To traverse the given area by GPS survey

13.	Setting out works - Foundation marking of a building
14.	To determine the wave points of the given points/ boundary by GPS survey
15.	Demonstration of DGPS- Single and Dual frequency.

COURSE OUTCOMES:

After completing the course, the students will have the ability to

- calculate the height of an inaccessible point by system of tacheometry and to apply field procedures in setting out of a curve.
- calculate the azimuth of a line by observation of sun.
- survey a large area using total station
- identify the type of curve required for the purpose of highways, railways etc., and plotting the same with appropriate accuracy
- operate the DGPS instrument

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Department	Civil Engineering		Programme Code and Name		C.E:B.E. Civil Engineering			
Semester - V								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
515CET01	CONCRETE TECHNOLOGY	3	0	0	3	50	50	100
OBJECTIVES	i) To impart knowledge to the students on the properties of materials for ordinary concrete ii) To impart knowledge to the students on mix design procedure. iii) To impart knowledge to the students on different tests on properties of concrete. iv) To impart knowledge to the students on the properties of special concrete							
UNIT-1	CONSTITUENT MATERIALS				TOTAL HOURS	9 HOURS		
Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications-Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements- Water- Quality of water for use in concrete.								
UNIT-2	CHEMICAL AND MINERAL ADMIXTURES				TOTAL HOURS	9 HOURS		
Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties								
UNIT-3	PROPORTIONING OF CONCRETE MIX				TOTAL HOURS	9 HOURS		
Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples								
UNIT-4	FRESH AND HARDENED PROPERTIES OF CONCRETE				TOTAL HOURS	9 HOURS		
Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young's Modulus.								

UNIT-5	**SPECIAL CONCRETES**	TOTAL HOURS	9 HOURS
Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete - SIFCON-Shotcrete – Polymer concrete - High performance concrete- Geopolymer Concrete			
TOTAL HOURS TO BE TAUGHT			**45 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	To know the properties of materials required for concrete		
CO.2	To know the design procedures for making concrete		
CO.3	To know the tests on concrete - Fresh and hardened concrete		
CO.4	To know the properties of different materials used for making special concrete		

TEXT BOOKS:

1.	Shetty, M.S., " Concrete Technology" , S. Chand and Company Ltd., 2002.
2.	Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010

REFERENCES:

1.	Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2007
2.	Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London, 2005
3.	Gambir, M.L; "Concrete Technology", 3 rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
4.	IS10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 2008

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515CET01 Concrete Technology																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To know the properties of materials required for concrete	3	2	2	3		1	1		1			2	2	1	3
CO2	To get the knowledge on mineral and chemical admixtures	3	2	2	3		1	1		1			2	2	1	3
CO3	To know the design procedures for making concrete	3	2	2	3		1	1		1			2	2	1	3
CO4	To know the tests on concrete - Fresh and hardened concrete	3	2	2	3		1	1		1			2	2	1	3
CO5	To know the properties of different materials used for making special concrete	3	2	2	3		1	1		1			2	2	1	3

515CET02 Structural Analysis - I																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Able to find the deflections of determinate structures.	3	3										2	3	3	
CO2	To understand the concept of influence line and able to draw for determinate structures.	3	3										2	3	3	

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CO3	To get the knowledge on two and three hinged arches and able to find the reactions.	3	3										2	3	3	
CO4	To draw the bending moment diagram by using slope deflection method.	3	3										2	3	3	
CO5	To draw the bending moment diagram by using moment distribution method.	3	3										2	3	3	

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Semester - V

Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
515CET03	**DESIGN OF RCC STRUCTURES**	**3**	**1**	**0**	**4**	**50**	**50**	**100**

OBJECTIVES

1. To study the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method.
2. To understand the behavior the structural elements.
3. To design of Basic elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures.
4. To posses knowledge on detailing of reinforcement in RC structures.

UNIT-1	**METHODS OF DESIGN OF CONCRETE STRUCTURES**	TOTAL HOURS	12 HOURS

Concept of Elastic method, working stress, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code

UNIT-2	**LIMIT STATE DESIGN FOR FLEXURE**	TOTAL HOURS	12 HOURS

Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects – Analysis and design of singly and doubly reinforced rectangular and flanged beams

UNIT-3	**LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR &TORSION**	TOTAL HOURS	12 HOURS
Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending shear and torsion.			
UNIT-4	**LIMIT STATE DESIGN OF COLUMNS**	TOTAL HOURS	12 HOURS
Types of columns – Braced and unbraced columns – Design of short column for axial, uniaxial and biaxial bending – Design of long columns – Standard method of detailing RC beams, slabs and columns.			
UNIT-5	**LIMIT STATE DESIGN OF FOOTING AND DETAILING**	TOTAL HOURS	12 HOURS
Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only – Special requirements of detailing with reference to erection process.			
TOTAL HOURS TO BE TAUGHT			**60 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	Use the IS codes for analysis and design of RC structures.		
CO.2	Analyze the structure to quantify the capacity of the constructed structures.		
CO.3	Design a RC building structure.		
CO.4	Detail the reinforcement in each elements of RC structure as per IS codal provisions.		
TEXT BOOKS:			
1.	Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt.Ltd.,New Delhi		
2.	Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi		
REFERENCES:			
1.	Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Rourkee		

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2.	Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Ltd., New Delhi.
3.	UnnikrishnaPillai, S., DevadasMenon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Co. Ltd., New Delhi
4.	Use of code books- IS – 456, IS- 875 & SP 16.

515CET03 Design of RCC Structures

CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Use the IS codes for analysis and design of RC structures.	3	3	3	1	-	1	1	-	-	-	1	-	3	2	1
CO2	Analyze the structure to quantify the capacity of the constructed structures.	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1
CO3	Design a RC building structure.	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1
CO4	Detail the reinforcement in each elements of RC structure as per IS codal provisions.	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1
CO5	Detail the connections between structural elements.	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1

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Adhiyamaan College of Engineering - Autonomous							Regulation	R-2015
Department	Civil Engineering		**Programme Code and Name**				C.E:B.E. Civil Engineering	
Semester-V								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
515CET04	**Water Supply Engineering**	3	0	0	3	50	50	100
OBJECTIVES	The main objectives of this course are 1. To study the determination of water requirement for public supply, 2. To understand the selection of sources of water, 3. To study the quality standards for public supply 4. To understand the concepts of treatment to make it potable for public supply & distribution.							
UNIT-1	WATER USES AND DEMAND OF WATER					TOTAL HOURS		9 HOURS
INTRODUCTION: Human activities and environmental pollution. Water for various beneficial uses and quality requirement. Need for protected water supply – Water Demand and Types of water demands - domestic demand, institutional and commercial demand, industrial demand, public uses and fire demand etc., Per capita consumption –factors affecting per capita demand, population forecasting, different methods with merits &demerits- variations in demand of water. Fire demand – estimation by Kuichling's formula, Freeman formula & national board of fire under writers' formula. Peak factors, design periods & factors governing the design periods.								
UNIT-2	SOURCES - COLLECTION AND CONVEYANCE OF WATER					TOTAL HOURS		9 HOURS
Surface and subsurface sources – suitability with regard to quality and quantity-Intake structures – different types of intakes; factor for selection and location of intakes. Pumps- Necessity, types of pumps; factors to be considered for the selection of a pumps. Pipes – Design of the economical diameter for the rising main; Nomo grams – use; Pipe appurtenances.								
UNIT-3	QUALITY OF WATER					TOTAL HOURS		9 HOURS
Objectives of water quality. Wholesomeness & palatability of water, water borne diseases. Water quality parameters – Physical, chemical and Biological. Sampling of water for examination. Water quality analysis using analytical and instrumental techniques. Drinking water standards as per BIS & WHO guidelines. Health significance of Fluoride, Nitrates and heavy metals like Mercury, Cadmium, Arsenic and toxic / trace organics.								
UNIT-4	WATER TREATMENT					TOTAL HOURS		9 HOURS

Water treatment flow-charts. Aeration- Principles of aeration, types of Aerators - Sedimentation-Theory, Types of settling tanks, design. Sedimentation aided with Coagulation, chemical feeding, flash mixing, and clari-flocculator -Filtration-Mechanism – theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design.– Back washing of filters. Operational problems in filters. Disinfection-Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. UV radiation treatment – treatment of swimming pool water - Softening – definition, methods of removal of hardness by lime soda process, zeolite process, RO & Membrane technique. Miscellaneous Treatment - Removal of color, odor & taste, use of copper sulfate, adsorption technique ,fluoridation and defluoridation- Removal of Iron & Manganese.			
UNIT-5	DISTRIBUTION SYSTEMS	TOTAL HOURS	9 HOURS
System of supply- service reservoirs and their capacity determination- methods of layout of distribution systems-Maintenance of Distribution Systems-Miscellaneous-Pipe appurtenances, various valves, type of fire hydrants, pipefitting, Leak Detection & layout of water supply pipes in buildings.			
TOTAL HOURS TO BE TAUGHT		45 HOURS	
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to:			
CO.1	Know about water demand, its source & collection		
CO.2	Understand the Standards applied for drinking water.		
CO.3	Design the appropriate water treatment plant for municipal water supply.		
CO.4	Understand & design the distribution system.		
TEXTBOOK			
1.	Water supply Engineering –S.K.Garg, Khanna Publishers, 24th revised edition, 2014		
2.	Environmental Engineering I –B.C. Punima and Ashok Jain, 2016 Edition,		
3.	Environmental Engineering –I Dr. P.N. Modi, 2010 Publication		
REFERENCES:			
1.	Manual on Water supply and treatment - CPHEEO, Ministry of Urban Development, New Delhi.		
2.	Standard Methods for the examination of Water and Waste Water-APHA- 17th Edition,		
3.	Hand Book on Water Supply and Drainage, SP35. BIS., New Delhi,		

515CET04 Water Supply Engineering																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Know about water demand, its source, collection and distribution	2	3	2				1						1	2	3
CO2	Identify the quantity and quality of water from various sources and processes involved in the water conveyance systems	1	2	2	2	1								2	3	1
CO3	Compute the quality and characteristics of wastewater.	1	3	2		2			1					2	1	
CO4	Infer the design principles of unit operations and processes for water treatment.	1	2	3		1		1	1					3	2	1
CO5	Justify method of distribution system.	2	3	3	2	1								1	3	2

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Adhiyamaan College of Engineering - Autonomous					Regulation		R - 2015
Department	Civil Engineering	Programme Code and Name			CE : B.E. Civil Engineering		
Semester - V							
Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA	TOTAL
515CET05	**FOUNDATION ENGINEERING**	**3**	**0**	**0**	**3**	**50**	**50**	**100**
OBJECTIVES	• To study the methods to investigate the soil condition, sampling techniques and to design suitable foundation. • To acquire knowledge of different types of shallow foundation and to proportion foundation. • To know the different types of pile foundation and their function. • To have complete knowledge of plastic equilibrium in soils and stability of retaining walls.							
UNIT-1	**SITE INVESTIGATION AND SELECTION OF FOUNDATION**				TOTAL HOURS		12 HOURS
Scope and objectives – Methods of soil exploration-augering and boring – Water boring and rotatory drilling – Depth of boring – Spacing of bore hole - Sampling – disturbed and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Geo physical exploration methods (Seismic refraction and Electrical Resistivity)Data interpretation (Strength parameters and Liquefaction potential) – Selection of foundation based on soil condition.							
UNIT-2	**SHALLOW FOUNDATIONS.**				TOTAL HOURS		12 HOURS
Introduction – Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimising settlement, differential settlement							
UNIT-3	**FOOTINGS AND RAFTS** ***Machine foundation***				TOTAL HOURS		12 HOURS
Types of foundation – Contact pressure distribution below footings & raft - Isolated and combined footings – types – proportioning - mat foundation – types – use - proportioning – floating foundation..*(design for all types of shallow foundation)*							
UNIT-4	**PILES**				TOTAL HOURS		12 HOURS
Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley's) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity – Group capacity by different methods (Feld's rule, Converse Labara formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test – Forces on pile caps – under reamed piles – Capacity under compression and uplift.							

UNIT-5	**RETAINING WALLS**	TOTAL HOURS	12 HOURS
Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil - Coloumb's wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.Machine foundation			
TOTAL HOURS TO BE TAUGHT			**60 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	Learn about the foundation types and methodology.		
CO.2	Design Shallow foundation..		
CO.3	Design raft foundation.		
CO.4	Design piles and retaining walls theories.		
TEXT BOOKS:			
1.	Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1999		
2.	GopalRanjan and Rao, A.S.R. "Basic and Applied Soil Mechanics", Wiley Eastern Ltd., New Delhi (India), 2003.		
3.	Punmia B.C., "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 1995.		
REFERENCES:			
1.	Das, B.M. "Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2003		
2.	Swamisaran, "Analysis and Design of Structures – Limit state Design", Oxford IBH Publishing Co-Pvt. Ltd., New Delhi, 1998		
3.	Kaniraj, S.R, "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi, 2002		
4.	Bowles J.E, "Foundation Analysis and Design", McGraw-Hill, 2004		
5.	Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2005		
6.	N.N. Som and S.C. Das, "Theory and Practice of Foundation Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2003		

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	515CET05 Foundation Engineering															
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Learn about the foundation types and methodology.	2	1	3	1	3	2	2	3	3	2	1	2	2	3	2
CO2	Design Shallow foundation.	3	1	2	3	3	2	3	3	1	2	2	1	3	2	2
CO3	Design raft foundation.	1	2	2	1	3	1	3	2	2	2	1	3	3	3	2
CO4	Design piles and retaining walls theories.	2	3	2	3	3	1	1	2	1	2	3	3	1	2	2
CO5	To study the methods to investigate the soil condition, sampling techniques and to design suitable foundation.	2	2	2	1	3	2	3	2	3	3	2	1	1	2	3

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CO3	Gain knowledge about groundwater exploration and designing of wells.	1	2	3	2	2	2	2	-	1	1	1	2	2	2	1
CO4	Evaluateartificial recharge methods and structuresfor groundwater managemen	1	2	1	2	1	1	1	-	1	2	-	1	1	1	1
CO5	design a ground water model for a basin	2	1	2	1	1	2	1	2	1	-	2	1	2	1	2

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Department	**Civil Engineering**			Programme Code and Name		**C.E:B.E. Civil Engineering**		
Semester - V								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	
515CEP07	**GEOTECHNICAL ENGINEERING LABORATORY**	0	0	3	2	50	50	
OBJECTIVES	At the end of this course, the student acquires the capacity to test the soil to assess its Engineering and Index properties.							
LIST OF EXPERIMENTS :								
1.	Determination of water content by oven drying method							
2.	Determination of Grain size distribution a) Sieve analysis b) Hydrometer analysis							
3.	Determination of Field density a) Core Cutter Method b) Sand Replacement Method							
4.	Determination of Specific gravity of soil grains							
5.	Determination of Relative density of sands							
6.	Determination of Atterberg limits test –Liquid limit ,Plastic limit & Shrinkage limit							

7.	Determination of Optimum Moisture Content & Maximum Dry Density - Standard Proctor test.
8.	Determination of Permeability -Constant head and Falling head methods
9.	Determination of shear strength parameters. a) Direct shear test on cohesion less soil b) Unconfined compression test on cohesive soil c) Triaxial compression test d) Vane shear test
10.	Determination of co-efficient of consolidation -One dimensional consolidation test
11.	Geophysical exploration
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	To Gain knowledge about Grain size distribution of soil
CO.2	To know fundamentals of Atterberg limits .
CO.3	To Determine the Field density and permeability of soil.
CO.4	To Evaluate the shear strength of soil.
REFERENCES	1. "Soil Engineering Laboratory Instruction Manual", Published by the Engineering College Co-operative Society, Chennai, 2002. 2. Head, K.H, "Manual of Soil Laboratory Testing (Vol-1 to 3)", John Wiley & Sons, Chichester, 1998. 3. "I.S.Code of Practice (2720) Relevant Parts", as amended from time to time. 4. Saibaba Reddy, E. and Rama Sastri, K., "Measurement of Engineering Properties of Soils", New Age International Publishers, New Delhi, 2002.

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Adhiyamaan College of Engineering – Autonomous							Regulation	R-2015
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Semester – VI								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615CET01	Structural Analysis – II	3	2	0	4	50	50	100

OBJECTIVES

To learn the matrix methods of analysis of beams and frames.

To understand the various methods of analysis of indeterminate structures.

To understand the principles of plastic analysis and behaviour of indeterminate structures.

To study the analysis of space structures

To understand Principles of and suspension cables

UNIT-1	FLEXIBILITY METHOD	TOTAL HOURS	12 HOURS

Equilibrium and compatibility – Determinate and Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy up to two).

UNIT-2	STIFFNESS METHOD	TOTAL HOURS	12 HOURS

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames.

UNIT-3	FINITE ELEMENT METHOD	TOTAL HOURS	12 HOURS

Introduction – Discretisation of a structure –Displacement functions-Truss element-Beam element-Plane stress and plane strain- Triangular elements.

UNIT-4	PLASTIC ANALYSIS OF STRUCTURES	TOTAL HOURS	12 HOURS

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems .

UNIT-5	SPACE AND CABLE STRUCTURES	TOTAL HOURS	12 HOURS

Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables - cables with two and three hinged stiffening girders		
TOTAL HOURS TO BE TAUGHT		**60 HOURS**
COURSE OUTCOMES:		
After undergoing the course, the students will have ability to		
CO.1	Analyse determinant and Indeterminate structure using Flexible method	
CO.2	Analyse structures using matrix methods.	
CO.3	Understand the basics of Finite Element Methods.	
CO.4	Know about plastic analysis of intermediate beams and frames.	
CO.5	Analyse space truss and suspension cables.	
TEXT BOOKS:		
1.	C.S.Reddy., "Basic Structural Analysis'',Tata McGraw-Hill Education, 2011	
2.	Vaidyanathan, R. and Perumail, P., "Comprehensive structural Analysis – Vol. I & II", Laxmi Publications, New Delhi, 2017	
3.	Coates R.C, Coutie M.G. and Kong F.K., "Structural Analysis", ELBS and Nelson, 1990	
4.	L.S. Negi& R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2004	
REFERENCES:		
1.	Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" –5th edition. Spon Press, London and New York, 2009.	
2.	Vazirani V.N, &Ratwani, M.M, "Analysis of Structures", Khanna Publishers, Delhi, 2004	
3.	G.S. Pandit & S.P. Gupta, "Structural Analysis – A Matrix Approach", Mcgraw Hill Education, 2009	
4.	Matrix Analysis of Framed Structures – Jr. William Weaver & James M. Gere, CBS Publishers and Distributors, Delhi, 2004	

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Department	**Civil Engineering**	Programme Code and Name	CE : B.E. Civil Engineering

Semester – VI

Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615CET02	**Design of Steel Structures**	3	2	0	**4**	50	50	100

OBJECTIVES

- To introduce the students to the limit state design concepts for steel design
- To study the design concepts of tension members.
- To study the design concepts of compression members.
- To study the design concepts of beams,
- To study the design concepts roof trusses and industrial structures.

UNIT-1	**INTRODUCTION**	TOTAL HOURS	12 HOURS

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using welding & bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts.

UNIT-2	**TENSION MEMBERS**	TOTAL HOURS	12 HOURS

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connectio in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT-3	**COMPRESSION MEMBERS**	TOTAL HOURS	12 HOURS

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base

UNIT-4	**BEAMS**	TOTAL HOURS	12 HOURS

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders welded – Intermediate and bearing stiffeners – Web splices – Design of beam columns

UNIT-5	**ROOF TRUSSES**	TOTAL HOURS	12 HOURS

Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing – Design of gantry girder

TOTAL HOURS TO BE TAUGHT	**60 HOURS**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1	Design steel structure elements using limit state design concept.
CO.2	Design bolted and welded joints.
CO.3	Use IS codes and Design tension, compression members and beams.
CO.4	Design roof trusses.
CO.5	Design Gantry girders and other industrial structures.

TEXTBOOKS:

1.	Dayaratnam, P., "Design of Steel Structures", Second edition, S. Chand & Company, 2003
2.	Duggal. S.K. "Limit state design of steel structures", Tata McGraw Hill Publishing company, 2005.

REFERENCES:	
1.	Bhavikatti. S.S "Design of Steel Structures" By Limit State Method as per IS800-2007,IK international publishing house Ltd,2009.
2.	"Teaching Resources for Structural Steel Design – Vol. I & II", INSDAG, Kolkatta.
3.	Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., "Design of Steel Structures", 3rd edition, McGraw-Hill Publications, 1992.

615CET02 Design of Steel Structures

CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Design steel structure elements using limit state design concept.	3	1	1	1	1			1	1			2	3	3	1
CO2	Design bolted and welded joints.	3	3	3	2	1			1	1			2	3	3	1
CO3	Use IS codes and Design tension, compression members and beams.	3	3	3	2	1			1	1			2	3	3	1
CO4	Design roof trusses.	3	3	3	2	1			1	1			2	3	3	1
CO5	Design Gantry girders and other industrial structures.	3	3	3	2	1			1	1			2	3	3	1

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Adhiyamaan College of Engineering - Autonomous						Regulation		R-2015
Department	Civil Engineering	**Programme Code and Name**				C.E:B.E. Civil Engineering		
Semester – VI								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615CET03	**Sanitary Engineering**	3	0	0	**2**	50	50	100
OBJECTIVES	• To introduce the students Basics of sanitary engineering • To study the design concepts of sewers and sewer appurtenances • To study of waste water characteristics • To understand principles of disposal of effluents • To study of the various waste water treatment process							
UNIT-1	**INTRODUCTION**				TOTAL HOURS	9 HOURS		
Sources of waste water-Necessity for sanitation, methods of domestic waste water disposal, types of sewerage systems and their suitability. Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration.								
UNIT-2	**DESIGN OF SEWERS, MATERIALS OF SEWERS AND SEWER APPURTENANCES**				TOTAL HOURS	9 HOURS		
Hydraulic formulae for velocity, effects of flow variations on velocity, self-cleansing and non-scouring velocities, Design of hydraulic elements for circular sewers flowing full and flowing partially full (No derivations).Sewer materials, shapes of sewers, laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers. Catch basins, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage.								
UNIT-3	**WASTE WATER CHARACTERIZATION**				TOTAL HOURS	9 HOURS		
Sampling, significance, techniques and frequency. Physical, Chemical and Biological characteristics, Aerobic and Anaerobic activity, CNS cycles. BOD and COD. Their significance & problems								
UNIT-4	**DISPOSAL OF EFFLUENTS**				TOTAL HOURS	9 HOURS		
Disposal of Effluents by dilution, self-purification phenomenon. Oxygen sag curve, Zones of purification, Sewage farming, sewage sickness, Effluent Disposal standards for land, surface water & ocean. Numerical Problems on Disposal of Effluents. Streeter Phelps equation.								
UNIT-5	**TREATMENT OF WASTE WATER AND SECONDARY TREATMENT**				TOTAL HOURS	9 HOURS		
Flow diagram of municipal waste water treatment plant. Preliminary & Primary treatment: Screening, grit chambers, skimming tanks, and primary sedimentation tanks – Design criteria & Design examples.								

Suspended growth, Trickling filter – theory and operation, types and designs. Activated sludge process-Principle and flow diagram, Design of ASP. Anaerobic Sludge digestion, Sludge digestion tanks, Design of Sludge drying beds. Low cost waste treatment method. Septic tank, Oxidation Pond and Oxidation ditches – Design. Reuse and recycle of waste water-A Case Study of Treatment and Reuse of Waste Water.	
TOTAL HOURS TO BE TAUGHT	**45 HOURS**
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	Learn about waste water sources and collection.
CO.2	The different types of Sewer systems.
CO.3	Know and identify waste water characterization
CO.4	Disposal the effluents in most efficient manner
CO.5	Design the unit processes for conventional and advanced waste water treatment
TEXT BOOKS:	
1.	S.K. Garg., "Environmental Engineering I & II", Khanna Publishers, 2017, New Delhi-2.
2.	B.C.Punmia "Environmental Engineering II", Laxmi Publication, 2016, New Delhi-2.
3.	Modi, P.N., "Environmental Engineering I & II", Standard Book House,2008 Delhi - 6
REFERENCES:	
1.	Manual on Waste Water Treatment: CPHEEO, Ministry of Urban Development, 2016 New Delhi.
2.	Waste Water Treatment, Disposal and Reuse: Metcalf and Eddy inc : Tata McGraw Hill Publications 2002.

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615CET03 SANITARY ENGINEERING																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Able to Learn about waste water sources ,disposal and design of storm flow	2	2	3	1									1	1	
CO2	Able to Know Design of sewer, sewer material and appurtenances.	1		2	3									2	1	
CO3	Compute the quantity and characteristics of wastewater.	1	3	2		2			11					2	1	
CO4	Point out the disposal methods of effluents	1	2	3	2			3	1					2	1	3
CO5	Express the design principles of various unit operations and processes for sewage treatment system.	2	1	3	3	2								3	2	1

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Adhiyamaan College of Engineering - Autonomous					Regulation		R-2015
Department	Civil Engineering				**Programme Code and Name**		**Department**
Semester – VI							
Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA	TOTAL
615CET04	**Transportation Engineering – II**	3	0	0	**2**	50	50	100
OBJECTIVES	• To provide the knowledge of planning, design, construction and maintenance of railway tracks. • To introduce the application of modern techniques such as GIS, GPS and remote sensing in Railway Engineering. • To study about the airport planning and design • To gain knowledge about Airport layouts and visual aids • To study about the planning of harbours & coastal structures.							
UNIT-1	**RAILWAY PLANNING AND DESIGN**				TOTAL HOURS		12 HOURS
Role of Indian Railways in National Development - Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipment) Permanent Way, its Components and Functions of each Component: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density Ballasts – Functions, Materials, Ballast less Tracks Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves							
UNIT-2	**RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION**				TOTAL HOURS		12 HOURS
Points and Crossings - Design of Turnouts, Working Principle Signalling-Interlocking and Track Circuiting Construction & Maintenance – Conventional, Modern methods and Materials-Track Drainage Track Modernisation– Automated maintenance and upgrading, Technologies, Re-laying of Track-Lay outs of Railway Stations and Yards-Rolling Stock-Tractive Power-Track Resistance-Level Crossings.							
UNIT-3	**AIRPORT PLANNING AND DESIGN**				TOTAL HOURS		12 HOURS

Advantages and Limitations of Air Transport, Components of Airports-Airport Planning – Air traffic potential, Site Selection, Design of Components, Cost Estimates, Evaluation and Institutional arrangements Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems)-Drainage Taxiway Design – Geometric Design Elements, Minimum Separation Distances, Design Speed-Airport Drainage Airport Zoning - Clear Zone, Approach Zone, Buffer Zone, Turning Zone, Clearance over Highways and Railways.			
UNIT-4	**AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL**	TOTAL HOURS	12 HOURS
Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and - Circulation Pattern, Case studies of Airport Layouts-Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings-Air Traffic Control – Basic Actions, Air Traffic Control Network Helipads, Hangars.			
UNIT-5	**HARBOUR ENGINEERING**	TOTAL HOURS	12 HOURS
Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports Requirements and Classification of Harbours Site Selection & Selection Investigation –Dredging, Range of Tides, Waves and Tidal Currents, Littoral Transport with Erosion and Deposition, Winds & Storms, , Construction Materials, Coast Lines Dry and Wet Docks,, Planning and Layouts Entrance, Position of Light Houses, Navigating Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids-Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders.			
TOTAL HOURS TO BE TAUGHT			**60 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	Plan and do the geometric design of the railway track and its elements.		
CO.2	Design turn outs and modern method of maintenance of railway track		
CO.3	Plan and design of the Runway and Taxiway		
CO.4	Design the elements of an airport and its layout, aids and traffic control.		
CO.5	Understand different terminologies in harbour Engineering		
TEXT BOOKS:			
1.	Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, DhanpatRai and Sons, Delhi, 2003.		

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2.	Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 2009.
3.	S P Bindra, A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.
REFERENCES:	
1.	Rangwala, Railway Engineering, Charotar Publishing House, 2008.
2.	Rangwala, Airport Engineering, Charotar Publishing House, 2014.
3.	Hasmukh P. Oza and Gautam H. Oza, "Dock & Harbour Engineering" Charotar Publishing House Pvt. Ltd., 2012.

615CET04 Transportation Engineering-II

CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	Plan and do the geometric design of the railway track and its elements.	1	-	3	-	-	-	-	1	-	-	1	1	3	3	-
CO 2	Design turn outs and modern method of maintenance of railway track	1	2	-	-	3	-	-	-	-	-	-	2	-	3	1
CO 3	Plan and design of the Runway and Taxiway	1	-	2	3	3	2	-	1	-	-	-	3	3	3	-
CO 4	Design the elements of an airport and its layout, aids and traffic control.	-	-	-	1	3	-	-	-	-	-	-	3	1	1	-
CO 5	Understand different terminologies in harbour Engineering	1	-	2	-	-	-	2	-	-	-	2	3	3	-	-

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Adhiyamaan College of Engineering - Autonomous						Regulation		R-2015
Department	Civil Engineering	**Programme Code and Name**				C.E:B.E. Civil Engineering		
Semester- **VI**								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615CET05	**Irrigation Engineering**	3	0	0	**2**	50	50	100
OBJECTIVES	To study the need and mode of irrigation. To learn about various irrigation methods To study the design concepts of various irrigation structures. To understand the design concepts of canal irrigation system To study the irrigation management practices.							
UNIT-1	**INTRODUCTION**					TOTAL HOURS		12 HOURS
Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – Consumptive use of water – Duty & Delta – Factors affecting duty – Irrigation efficiencies.								
UNIT-2	**IRRIGATION METHODS**					TOTAL HOURS		12 HOURS
Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation.								
UNIT-3	**DIVERSION HEAD WORKS AND IMPOUNDING STRUCTURES**					TOTAL HOURS		12 HOURS
Weirs – Elementary profile of a Weir – Weirs on pervious foundations – Dams - Factors affecting location and types of dam – Forces on a dam – Types of dam - Gravity dams – Earth dams – Arch dams –Design of a Gravity dam – Types of impounding structures - Tanks and Sluices .								
UNIT-4	**CANAL IRRIGATION**					TOTAL HOURS		12 HOURS
Alignment of canals – Classification of canals – Canal drops – Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal Head works – Canal regulators – River Training works.								
UNIT-5	**IRRIGATION WATER MANAGEMENT**					TOTAL HOURS		12 HOURS
Need for optimisation of water use – Minimising irrigation water losses – On farm development works – Percolation ponds – Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation- **Planning and Development of irrigation projects.**								
TOTAL HOURS TO BE TAUGHT						60 HOURS		
COURSE OUTCOMES:								
After undergoing the course, the students will have ability to:								
CO.1	Know types and methods of irrigation system.							

CO.2	Have more knowledge focussed on irrigation and water resources engineering.
CO.3	Apply multidisciplinary approaches to plan, design and execute relevant irrigation and water resources structures
CO4	Design various irrigation structures like canal regulators, cross drainage works, canal headwork's etc.,
CO5	Ability to evaluate Irrigation management system and development of irrigation projects
TEXTBOOK	
1.	Asawa, G.L., "Irrigation Engineering", New Age International Publishers. 2005
2.	Sharma R.K., and Sharma T.K., "Irrigation Engineering", S. Chand and company, New Delhi. 2002
3.	Gupta, B.L, & Amir Gupta, "Irrigation Engineering", SatyaPraheshan, New Delhi. 2013
REFERENCES:	
1.	Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd., 2014
2.	Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co.2017
3.	Garg, S.K., "Irrigation Engineering& hydraulic structures –vol -2kanna publishers-2017"
4.	Dr. H.M. Ragunath -Irrigation Engineering- Wiley eastern ltd, New Delhi, 2014

615CET05 Irrigation Engineering

CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	*Know types and methods of irrigation system.*	1	-	-	1	-	1	1	-	-	-	-	-	1	-	1
CO2	Have more knowledge focussed on irrigation and water resources engineering.	2	2	1	1	-	1	1	-	-	-	-	-	1	-	1
CO3	Apply multidisciplinary approaches to plan, design and execute	2	3	3	-	-	1	1	-	-	-	-	-	1	-	1

3.	Shah, Kale and Patki, Building Drawing, Tata McGraw-Hill.

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Department	**Civil Engineering**	Programme Code and Name			**C.E:B.E. Civil Engineering**			
Semester – VI								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615XXXXX	**ADVANCED CONCRETE TECHNOLOGY**	3	0	0	**3**	50	50	100
OBJECTIVES	• To study the properties of concrete making materials, • To study the Fresh and Harden properties of concrete, • To develop the require mix design • To gain knowledge of special concrete • To learn about various concreting methods							
UNIT-1	**CONCRETE MAKING MATERIALS**				TOTAL HOURS		9 HOURS	
Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified grading, testing of aggregates. Cement, Grade of cement, Chemical composition, testing of concrete, Hydration of cement, Structure of hydrated cement, special cements. Water Chemical admixtures, Mineral admixture.								
UNIT-2	**TESTS ON CONCRETE**				TOTAL HOURS		9 HOURS	
Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete								
UNIT-3	**MIX DESIGN**				TOTAL HOURS		9 HOURS	
Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Statistical quality control – Sampling and acceptance criteria.								
UNIT-4	**SPECIAL CONCRETE**				TOTAL HOURS		9 HOURS	

615CEE01 Advanced Concrete Technology																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	know various tests on fresh properties of concrete.	3	-	1	2	-	-	-	-	-	-	-	2	-	-	-
CO2	know various tests on hardened concrete,	3	2	1	2	2	-	-	-	-	-	-	2	-	-	-
CO3	Know concreting mix designs as per codes	3	2	2	1	-	-	-	2	-	2	3	2	3	2	-
CO4	know about some special types of concrete	3	-	-	2	-	2	3	2	-	-	-	-	-	2	2
CO5	know about types of concreting methods and Dewatering Techniques	3	-	1	-	3	2	2	-	2	1	2	2	2	1	3

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Light weight concrete, Fly ash concrete, Fibre reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting-Concrete, Geo Polymer Concrete, Waste material based concrete – Ready mixed concrete.			
UNIT-5	**CONCRETING METHODS**	TOTAL HOURS	9 HOURS
Process of manufacturing of concrete, methods of transportation, placing and curing. Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete.			
TOTAL HOURS TO BE TAUGHT			**45 HOURS**
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	know various tests on fresh properties of concrete.		
CO.2	know various tests on hardened concrete,		
CO.3	Students are capable to do the Mix design as per IS.		
CO.4	know about some special types of concrete and Dewatering Techniques		
CO.5	know about types of concreting methods and Dewatering Techniques		
TEXT BOOKS:			
1.	Gambhir.M.L., Concrete Technology, McGraw Hill Education, 2006.		
2.	Gupta.B.L., Amit Gupta, "Concrete Technology, Jain Book Agency, 2010.18		
3.	Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2003.		
REFERENCES:			
1.	Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.		
2.	S.S.Bhavikatti.,"Concrete Technology",I K International Publishing House,2015.		

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Adhiyamaan College of Engineering – Autonomous							R-2015		
Department	Civil Engineering		Programme Code and Name				B.E.CIVIL ENGINEERING		
Semester-III									
Course Code	Course Name	Hours/week			Credit	Maximum Marks			
		L	T	P	C	CA	EA	TOTAL	
	PREFABRICATED STRUCTURES	3	0	0	3	50	50	100	
OBJECTIVES	• To Study design principles involved in the prefabricated structures. • To make the students to understand the concepts of prefabricating the framed buildings • To possess the knowledge on connection of various structural elements • To gain knowledge about wall panels its behaviour and design • To enrich the students on construction of industrial buildings using prefabricated elements.								
UNIT-1	**Design Principles**				TOTAL HOURS	9 HOURS			
General Civil Engineering requirements, specific requirements for planning and layout of prefabricates plant. IS Code specifications Modular co-ordination, standardization, Disuniting of Prefabricates, production, transportation, and erection, stages of loading and codal provisions, safety factors, material properties, Deflection control, Lateral load resistance, Location and types of shear walls.									
UNIT-2	**Prefabricated Reinforced Concrete Structural Elements**				TOTAL HOURS	9 HOURS			
Prefabricated structures - Long wall and cross-wall large panel buildings, one way and two way prefabricated slabs, Framed buildings with partial and curtain walls, -Connections – Beam to column and column to column.									
UNIT-3	**Floors, Stairs and Roofs**				TOTAL HOURS	9 HOURS			
Types of floor slabs, analysis and design example of cored and panel types and two way systems, staircase slab design, types of roof slabs and insulation requirements, Description of joints, their behaviour and reinforcement requirements, Deflection control for short term and long term loads, Ultimate strength calculations in shear and flexure.									
UNIT-4	**Walls**				TOTAL HOURS	9 HOURS			
Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, load transfer from floor to wall panels, vertical loads, Eccentricity and stability of wall panels, Design Curves, types of wall joints, their behaviour and design, Leak prevention, joint sealants, sandwich wall panels, approximate design of shear walls.									
UNIT-5	**Industrial Buildings and Shell Roofs**				TOTAL HOURS	9 HOURS			
Components of single-storey industrial sheds with crane gantry systems, R.C. Roof Trusses, Roof Panels, corbels and columns, wind bracing design. Cylindrical, Folded plate and hyper-prefabricated shells, Erection and jointing, joint design, hand book based design.									
TOTAL HOURS TO BE TAUGHT						45 HOURS			
COURSE OUTCOMES:									
After undergoing the course, the students will have ability to									
CO.1	Understand the basic concepts of prefabrication and their needs in construction industry.								
CO.2	Knowing the behaviour of prefabricated structures.								

CO.3	Design the cross section and joints of prefabricated units
CO.4	Design the wall panels partition and load bearing walls of prefabricated units
CO.5	To construct the pre-fabricated structures with various structure elements

REFERENCES:

1.	**Structural Design Manual**, *Precast Concrete Connection Details*, Society for the Studies in the use of Precase Concrete, Netherland BetorVerlag, 1978.
2.	**Hass, A.M.** *Precast Concrete Design and Applications*, Applied Science Publishers, 2003.
3.	**Promislow, V***Design and Erection of Reinforced Concrete Structures*, MIR Publishers, Moscow.
4.	**Gerostiza. C.Z., Hendrikson, C. and Rehat D.R.,** *Knowledge Based Process Planning for Construction and Manufacturing*, Academic Press, Inc., 2009.

615CEE02 Prefabricated Structures

CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the basic concepts of prefabrication and their needs in construction industry.	3	-	-	1	-	1	1	2	-	-	-	1	-	2	1
CO2	Knowing the behaviour of prefabricated structures.	3	-	-	1	-	1	1	2	-	-	-	1	-	2	1
CO3	Design the cross section and joints of prefabricated units	3	3	3	3	2	2	2	1	2	1	2	1	3	2	3
CO4	Design the wall panels partition and load bearing walls of prefabricated units	3	3	3	3	2	2	2	1	2	1	2	1	3	3	3
CO5	To construct the pre-fabricated structures with various structure elements	3	2	2	3	2	2	2	2	1	2	2	1	3	1	3

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Adhiyamaan College of Engineering - Autonomous					Regulation			R-2015
Department	Civil Engineering		Programme Code and Name		C.E:B.E. Civil Engineering			
Semester – VI								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615XXXXX	EARTHQUAKE RESISTANT DESIGN	3	0	0	3	50	50	100
OBJECTIVES	• To study the effect of earthquakes, • To understand degrees of freedom, evaluation and effects of earth quake • To analysis and design of earthquake resistant Structures • To study about ductile detailing of structures • To understand the concepts of vibration control techniques							
UNIT-1	SEISMOLOGY				TOTAL HOURS	9 HOURS		
Engineering Seismology (Definitions, Introduction to Seismic hazard, Earthquake Phenomenon), Seismic Zoning of India, Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory Estimation of earthquake parameters - Magnitude and intensity of earthquakes - Seismic Instrumentation - Microzonation. - Lessons Learnt From Past Earthquakes								
UNIT-2	DEGREES OF FREEDOM				TOTAL HOURS	9 HOURS		
Dynamics of Structures - degree of freedom system – modes of vibrations & mode shapes – formulation of equations of motion of SDOF, TDOF & MDOF - Eigen values and Eigen vectors – Response Spectra - Evaluation of Earthquake Forces as per codal provisions - Effect of Earthquake on Different Types of Structures.								
UNIT-3	SEISMIC AND ASEISMIC DESIGN OF STRUCTURES				TOTAL HOURS	9 HOURS		
Response spectrum IS1893:2002 – Concepts of PGA – Codal provisions for seismic analysis of RC building as per IS1893:2002 – Design problems – Aseismic Design of a Multistory RC Building as per IS13920:1990								
UNIT-4	DUCTILE DETAILING OF RC STRUCTURES				TOTAL HOURS	9 HOURS		
Codal provisions for ductile detailing of RC structures subjected to seismic force – Flexural members (Longitudinal, Web Reinforcement0 – Column & Frame (Longitudinal, Transverse, & Special confining Reinforcement)								
UNIT-5	VIBRATION CONTROL TECHNIQUES				TOTAL HOURS	9 HOURS		

Vibration Control - Tuned Mass Dampers – Principles and application, Basic Concept of Seismic Base Isolation – various types of damper- Case Studies, Important structures.	
TOTAL HOURS TO BE TAUGHT	**45 HOURS**
COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	understand the causes and effect of earthquake..
CO.2	draw the mode shape for a SDOF, TDOF, MDOF Structures
CO.3	design masonry and RC structures to the earthquake forces as per the recommendations of IS codes of practice.
CO.4	Ductile detailing of RC Structures
CO.5	They will be able to understand the concepts of damping and vibration control techniques
TEXT BOOKS:	
1.	Mohiuddin Ali Khan "Earthquake-Resistant Structures: Design, Build and Retrofit", Elsevier Science & Technology, 2012
2.	Pankaj Agarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2009.
3.	Paulay,T and Priestley, M.J.N., "Seismic Design of Reinforced Concrete and Masonry buildings", John Wiley and Sons, 1992.
REFERENCES:	
1.	Brebbia C. A.,"Earthquake Resistant Engineering Structures VIII",WIT Press, 2011
2.	Bruce A Bolt, "Earthquakes" W H Freeman and Company, New York, 2004.
3.	Duggal S K , "Earthquake Resistant Design of Structures", Oxford University Press, 2007.

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615CEE03 Earthquake Resistant Structures																
CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Get the knowledge on seismology	3	2	3	2		1		1		2		2	3	2	1
CO2	To find the EOM, natural frequency and mode shape for SDOD and TDOD	3	2	3	2		1		1		2		2	3	2	1
CO3	Able to design the RCC structures by using seismic codes	3	2	3	2		1		1		2		2	3	2	1
CO4	Get the knowledge on ductile detailing as per IS	3	2	3	2		1		1		2		2	3	2	1
CO5	To know the concepts of base isolation techniques	3	2	3	2		1		1		2		2	3	2	1

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Adhiyamaan College of Engineering - Autonomous						Regulation		R-2015
Department	Civil Engineering		Programme Code and Name			C.E:B.E. Civil Engineering		
Semester – VI								
Course Code	Course Name	Hours/week			Credit	Maximum Marks		
		L	T	P	C	CA	EA	TOTAL
615XXXXX	DESIGN OF PSC STRUCTURES	3	0	0	3	50	50	100

OBJECTIVES	• To introduce the need for pressurising as well as the methods, • To study the types and advantages of prestressing. • To the design of pressurised concrete structures subjected to flexure and shear. • To study about defection zones and design of anchorage zone • To understand the concepts of composite beams, continuos beams and miscellaneous structures

UNIT-1	**INTRODUCTION – THEORY AND BEHAVIOUR**	TOTAL HOURS	9 HOURS

Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width.

UNIT-2	**DESIGN FOR FLEXURE AND SHEAR**	TOTAL HOURS	9 HOURS

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

UNIT-3	**DEFLECTION AND DESIGN OF ANCHORAGE ZONE**	TOTAL HOURS	9 HOURS

Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT-4	**COMPOSITE BEAMS AND CONTINUOUS BEAMS**	TOTAL HOURS	9 HOURS

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems .			
UNIT-5	**MISCELLANEOUS STRUCTURES**	TOTAL HOURS	9 HOURS
Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables - cables with two and three hinged stiffening girders			
TOTAL HOURS TO BE TAUGHT		**45 HOURS**	
COURSE OUTCOMES:			
After undergoing the course, the students will have ability to			
CO.1	Analyse Prestressed concrete sections.		
CO.2	design prestressed concrete sections for flexure and shear		
CO.3	Analyse and design composite and continuous beams		
CO.4	Design Anchorage zone		
CO.5	Design prestressed concrete pipes and tanks.		
TEXT BOOKS:			
1.	Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012		
2.	Pandit.G.S. and Gupta.S.P., " Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012		
REFERENCES:			
1.	Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2002.		
2.	Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, 2013		
3.	Lin T.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.		
4.	IS1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012		

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Adhiyamaan College of Engineering--Autonomous								Regulation	R-2015
Department	Civil Engineering	Programme Code and Name						M.E STRUCTURAL ENGINEERING	
Semester-III									
Course Code	Course Name	Hours/week			Credit	Maximum Marks			
		L	T	P	C	CA	EA	TOTAL	
615XXXXX	**SMART STRUCTURES**	3	0	0	3	50	50	100	
OBJECTIVES	To describe the basic principles and mechanisms of smart materials To gain knowledge about various devise in smart systems. To study the principles underlying the behaviour of smart materials. To gain knowledge about control systems To study about sensors in smart structures.								
UNIT-1	**Introduction to passive and active systems**					TOTAL HOURS		9 HOURS	
Introduction to passive and active systems – need for active systems – smart systems –definitions and implications - active control and adaptive control systems – examples.									
UNIT-2	**Components of smart systems**					TOTAL HOURS		9 HOURS	
Components of smart systems– system features and interpretation of sensor data – proactive and reactive systems – demo example in component level – system level complexity									
UNIT-3	**Materials used in smart systems**					TOTAL HOURS		9 HOURS	
Smart Materials (Physical Properties) piezoelectric materials, materials, magneto strictive electrostrictive materials, magneto electric materials. magneto rheological fluids, electrorheological fluids, shape memory materials, fiber-optic sensors.									
UNIT-4	**Control Systems**					TOTAL HOURS		9 HOURS	
Control Systems – features – active systems – adaptive systems – electronic, thermal and hydraulic type actuators – characteristics of control systems – application examples.									
UNIT-5	**Sensors in smart structures**					TOTAL HOURS		9 HOURS	
Smart Sensor, Actuator and Transducer Technologies smart sensors: accelerometers; force sensors; load cells; torque sensors; pressure sensors; microphones; impact hammers; mems sensors; sensor arrays smart actuators: displacement actuators; force actuators; power actuators; vibration dampers; shakers; fluidic pumps; motors smart transducers: ultrasonic transducers; sonictransducers; air transducers.									
TOTAL HOURS TO BE TAUGHT								45 HOURS	
COURSE OUTCOMES:									
After undergoing the course, the students will have ability to									
CO.1	understand principles and mechanisms of smart materials								
CO2	Work with various types of material used in smart structures								
CO3	Make use of the principles of control system in smart structures								

CO4	Work with various types of Sensors used in smart structures
CO5	Utilize the smart materials in effective manner

REFERENCES:

1. Srinivasan, A.V. and Michael McFarland, D., Smart Structures: Analysis and Design, Cambridge University Press, 2000.
2. Yoseph Bar Cohen, Smart Structures and Materials 2003, The International Society for Optical Engineering 2003.
3. Brian Culshaw, Smart Structures and Materials, Artech House, Boston, 2006.
4. M.V.Gandhi and B.S.thompson, Smart Materials and Structures, Chapman and Hall 2002.

615CEE05 Smart Structures

CO's		PO's												PSO's		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Know about smart materials	1	1		2	2		1	1				1	2	2	
CO2	Know about various measuring techniques.	1	1		2	2		1	1				1	2	2	
CO3	Know about sensors	1	1		2	2		1	1				1	2	2	
CO4	Know about actuators	1	1		2	2		1	1				1	2	2	
CO5	Know about signal processing and control system.	1	1	1	2	2		1					1	2	2	

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	relevant irrigation and water resources structures															
CO4	Design various irrigation structures like canal regulators, cross drainage works, canal headwork's etc.,	1	2	3	-	-	1	1	-	-	-	-	-	1	2	1
CO5	Ability to evaluate Irrigation management system and development of irrigation projects	1	-	-	-	-	1	1	-	-	1	-	-	1	1	1

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Adhiyamaan College of Engineering – Autonomous		
Department	**Civil Engineering**	Programme Code and Name
Semester – VI		
Course Code	Course Name	
611CEP08	**CONCRETE AND HIGHWAY MATERIALS LABORATORY**	
OBJECTIVES	To study various testing procedure to know the properties of cement To study various testing procedure to know the properties of aggregates To study various testing procedure to know the properties of Bitumen To learn about the various tests conducted to know the properties of concrete To gain knowledge about the mix-design concepts for various grades of concretes.	
LIST OF EXPERIMENTS		
TESTS ON CEMENT		

1. Specific Gravity Test For Cement
2. Normal Consistency Test For Cement
3. Setting Time Of Cement
4. Compressive Strength Of Cement
5. Fineness Test For Cement
TESTS ON AGGREGATE
1Aggregate Crushing Test
2 Abrasion Test
3.Shape Test – Flakiness Index, Elongation Index, Angularity Number
4.Specific Gravity And Water Absorption Test For Coarse Aggregate
TESTS ON CONCRETE
1. Slump Test
2. Compaction Factor Test
3. Vee-Bee Consistometer Test
4. Compressive Strength Of Concrete
5. Split Tensile Strength Of Concrete
MIX DESIGN FOR VARIOUS GRADES OF CONCRETE
TESTS ON BITUMEN
1. Specific Gravity Test For Bitumen
2. Penetration Test
3. Viscosity Test
4. Ductility Test
5. Flash & Fire Point Test
6. Softening Test
COURSE OUTCOMES:

After undergoing the course, the students will have ability to	
CO.1	Find out the properties of cement.
CO.2	Find out the properties of aggregate.
CO.3	Find out the properties of Bitumen
CO.4	Find out the properties of concrete.
CO.5	Design concrete mix design

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TEXT BOOKS:	
1.	Shetty, M.S., "Concrete Technology" , S. Chand and Company Ltd., 2002.
2.	Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010
REFERENCES:	
1.	Job Thomas "Concrete Technology" , Oxford University Press, Cengage Learning India, 2015
2.	Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London, 2012
3.	Gambir, M.L; "Concrete Technology", 3 rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
4.	P.Kumar Mehta.,"Concrete Microstructure, Properties and Materials", McGraw Hill Education, 2017
5.	IS10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 2008

Adhiyamaan College of Engineering – Autonomous				Regulation	R - 2015		
Department	**Civil Engineering**	Programme Code and Name		**C.E:B.E. Civil Engineering**			
Semester – VI							
Course Code	Course Name	Hours/week			Credit	Maximum Marks	
		L	T	P	C	CA	EA
615CEP09	**Computer Aided Design – I**	0	0	3	**2**	50	50
OBJECTIVES	• to draft on computer building drawings (Plan, elevation and sectional views) of a load bearing walls • to draft on computer building drawings (Plan, elevation and sectional views) of a details of doors and windows • to draft on computer of one and two storey RCC Framed structures • to draft on computer of a different types of trusses • To learn the principle to draw perspectives views of one and two storey buildings						
LIST OF EXPERIMENTS :							
1. Drawing of buildings with load bearing walls (Drawing of Flat and pitched roof) – Including details of doors and windows s)							
2. RCC framed structures – One and Two storey building(Plan, Section and Elevation)							
3. Industrial buildings – North light roof structures – Trusses							
4. Perspective view of one and two storey buildings							
COURSE OUTCOMES:							
After undergoing the course, the students will have ability to							
CO.1	Draw the load bearing walls						
CO.2	Draw the details of doors and windows						
CO.3	Draw the different types of roofs trusses						
CO.4	Draw the plan sectional elevation of a structure						
CO.5	Draw the different views of a structure						
REFERENCE:							
1.	Building drawing – Shah, Tata McGraw-Hill						
2.	Building planning & Drawing – Dr. N. Kumaraswamy, A. KameswaraRao, Charotar Publishing						

Choice 11

Adhiyamaan College of Engineering - Autonomous				Regulation		R – 2015	
Department	**Civil Engineering**	**Programme Code and Name**		**C.E:B.E. Civil Engineering**			
Semester – VI							
Course Code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
		L	**T**	**P**	**C**	**CA**	**EA**
615XXXXX	**Irrigation Drawing**	**0**	**0**	**3**	**2**	**50**	**50**
OBJECTIVES	To learn the fundamentals of the design of tank components						
	To learn the general principles of impounding structures draw the plan elevation and the cross sectional details of it						
	To learn the general principles of canal regulation systems and draw the plan elevation and the cross sectional details of it						
	To know the general design principles of cross drainage works and design & draft its plan, elevation and cross sectional details						
	To know the general design principles of cross regulation structures and design & draft its plan, elevation and cross sectional details						
UNIT 1-TANK COMPONENTS Fundamentals of design-Tank surplus weir-Tank sluice with tower head-Drawing showing foundation details, plan and Elevation.							
UNIT-2-IMPOUNDING STRUCTURES Design principles-earth dam-Profile of Gravity dam							
UNIT-3 –CROSS DRAINAGE WORKS General design principles- Aqueducts- Syphon aqueduct(Type 3)- Canal drop (Notch type)- Drawing showing plan, elevation and cross sectional details							
UNIT-4 CANAL REGULATION STRUCTURESGeneral Principles-Direct sluice, Canal regulation-Drawing showing detailed plan, elevation and cross sectional details							

COURSE OUTCOMES:	
After undergoing the course, the students will have ability to	
CO.1	Design and draft the various components of the Tank.
CO.2	Design and draft the various irrigation impounding structures.
CO.3	Know about the various aspects in canal drainage works.
CO.4	Design and draft cross drainage structures
CO.5	Design and draft canal regulation structures
TEXT BOOKS	
1	Satyanarayana Murthy Challa, " Water resources engineering and practice", New age International publishers, New Delhi, 2002
2	Garg S.K," Irrigation engineering and desigm of structures", New age international publishers, New Delhi, 1997.
REFERENCES:	
1.	Raghunath H.M, "Irrigation Engineering", Wiley India Pvt ltd, New Delhi, 2011
2.	Sharma R.K, "Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Co., New Delhi, 2002

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Adhiyamaan College of Engineering								
Department	Civil Engineering	Programme Code & Name	CE : B.E. Civil Engineering					
Semester VI								
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ES	Total
ENVIRONMENTAL ENGINEERING DRAWING		0	0	3	2	50	50	100

Objective(s)	To study the process, design of major treatment units associated with water and sewage. To design and draft mixing basin, flocculation tank To understand the principles in designing and drafting slow sand filter/rapid sand filter To draw a major treatment units associated with water and sewage with scale To learn at the end of the course, about the designing of various treatment units and respective drawings.

CYCLE – I

Detailed Design and Drawing of

1. Layout of water supply scheme
2. Mixing basin, flocculation and sedimentation tanks
3. Slow sand filter
4. Rapid sand filter
5. Infiltration gallery

CYCLE - II

Detailed Design and Drawing of

1	Layout of sewage treatment plant
2	Design of primary and secondary settling tanks
3	Trickling filter
4	Man holes, Pumping stations for water and sewage treatment works
5	Septic tanks with dispersion trench
6	Effluent Treatment Plant Design
7	Design of Water supply and Sewage treatment for a city

Course Outcomes

1	Outline the layout of water and sewage treatment plant for a city.
2	Explain the design principles of various water and sewage treatment units.
3	Design the water supply and sewage treatment system for a city.
4	Prepare the design parameters for water treatment systems and sketch the detailed drawings with scale

Total hours to be taught	45

column. In this, the details of reinforcement at the junction with beams must be shown from the given design data
8. Design and detailing of reinforcement in square, circular and trapezoidal footings
COURSE OUTCOMES:
After undergoing the course, the students will have the ability to ➢ Understand the given plan, sectional view of a buildings and implement the same in construction site. ➢ Prepare the bar bending schedules for the given building ➢ Develop the structural drawing for various RCC elements. ➢ Develop the structural drawing for square, trapezoidal and circular footings ➢ Prepare the detailed drawing of reinforcement's details for any kind of buildings.
1. SP-34-1987 Handbook on Reinforcement and Detailing. 2. Mallick, SK; and Gupta, AP; "Reinforced Concrete", New Delhi, Oxford and IBH Publishing Co. 2007. 3. Dayarathnam P "Design of reinforced concrete structures" Publisher: New Delhi : Oxford & IBH Publishing, 2000 4. P C Varghese "Limit State Design of Reinforced Concrete " Prentice Hall of India, 1999.

711CET02 ESTIMATION AND QUANTITY SURVEYING

OBJECTIVE **4 1 0 3**

This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works. This also covers the rate analysis for estimation of various items. At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents.

1. INTRODUCTION 3

Estimate, Data, Rates; Type-Preliminary, Approximate. Abstract estimate; Plinth area estimate; Cube rate estimate. Plinth area; Floor area; Circulation area; Carpet area.

2. ESTIMATE OF BUILDINGS 12

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches.

3. ESTIMATE OF OTHER STRUCTURES 12

Estimating of septic tank, soak pit – sanitary and water supply installations –estimate of earth work of road by three methods from L - Section- estimate of bituminous and cement concrete roads – estimate of retaining walls–estimate of earth work irrigation channels of different cases.

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4. Analysis of Rates & Specifications. 6

Data – Schedule of rates –Preparing Analysis of rates for different items of works–Transport of material – Estimate of transport work- Specifications – sources – Detailed and general specifications.,

5. P.W.D. Accounts and Procedure for Woks.

Works; Classification of works-Original, Major, Minor, Petty, Repair works; Annul repair,. Quadrennial repair, Special repair works, Contract, Tender; Tender Notice; Earnest money; Security money; Arrenging contract; Power of accepting tender, Tender notice, Methods of carrying out works – Daily labour; Muster Roll, Preparation of M.R.

TOTAL : 45

TEXT BOOKS

1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003
2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand& Company Ltd., 2004

711CET03REMOTE SENSING AND GIS

OBJECTIVE 3 0 0 2

At the end of the course the student will posses knowledge of Remote Sensing Techniques and its application in natural resource management. urban land use planning, site suitability analysis identification of groundwater potential zones, recharge areasCrop inventory mapping forest types and density mapping use of remote sensing data for landslides

1. INTRODUCTION 9

Definition – Physics of remote sensing – electromagnetic radiation (EMR) – remote sensing windows – interaction of EMR with atmosphere, earth surface, soils, water and vegetation – platform and sensors – image interpretations.

2. LAND USE STUDIES 9

Definition of land use – land use / land cover classification – schemes and levels of classification systems with RS data – land use mapping – change detection – urban land use planning, site suitability analysis, transportation planning.

3. WATER RESOURCES 9

Areal assessment of surface water bodies – Capacity survey of water bodies – mapping of snow-covered areas – flood risk zone mapping – identification of groundwater potential zones, recharge areas – droughts, definition, drought assessment and management.

4. AGRICULTURE, SOIL AND FORESTRY 9

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Crop inventory mapping – production estimation – command area monitoring – soil mapping – crop stress detection - estimation of soil erosion – forest types and density mapping – forest fire risk zone mapping.

5. EARTH SCIENCE **9**

Lithology – lithological mapping – structural mapping – Geomorphology – nature and type of landforms – identification – use of remote sensing data for landslides – targeting mineral resources – Engineering geology and Environmental geology.

TOTAL : 45

REFERENCES

1. Lillesand, T.M and Kicter R.W. Remote Sensing and Image interpretation. John Willey and sons, inc. New York, 2002.
2. **Michael Hord, R. Remote sensing methods and application, John Wiley and Sons, New York, 1986.**
3. Steven, M.D, and Cllark, J.A. Application of Remote sensing in Agriculture, Butterworths, London, 1990.
4. Space Applications Centre. Manual for Forest mapping and Damage detection using satellite data, Report No.IRS-UP/SAC/FMDD/TN/16/90,1990, pp-253.
5. Sabins, F.F.Jr. Remote sensing principles and interpretation, W.H.Freeman& Co., 1978.
6. Manual of Remote Sensing Vol. II. American Society of Photogrammetry

711CEE10 INSTRUMENTATION FOR CIVIL ENGINEERS

OBJECTIVE **4 0 0 3**

This course is designed to give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

1. INTRODUCTION **9**

Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

2. MEASURING TECHNIQUES **9**

Strain Measuring Techniques using Electrical strain gauges. Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

3. SENSORS **9**

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.

Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

4. ACTUATORS **9**

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

5. SIGNAL PROCESSING AND CONTROL SYSTEMS **9**

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

TOTAL: 45

TEXT BOOKS

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.

REFERENCES

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.
2. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

711CEE05 PREFABRICATED STRUCTURES

OBJECTIVE **4 0 0 3**

At the end of this course the student shall be able to appreciate modular construction, industrialised construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.

1. INTRODUCTION **9**

Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.

2. PREFABRICATED COMPONENTS **9**

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls

3. DESIGN PRINCIPLES **9**

Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

4. JOINT IN STRUCTURAL MEMBERS **9**

Joints for different structural connections – Dimensions and detailing – Design of expansion joints

5. DESIGN FOR ABNORMAL LOADS **9**

Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

TOTAL : 45

TEXT BOOKS

1. CBRI, Building materials and components, India, 1990
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

REFERENCES

1. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
2. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 1978.

711CEP07Computer aided design laboratory – II

OBJECTIVE **0 0 4 2**

At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

1. Design and drawing of RCC cantilever and counterfort type retaining walls with reinforcement details
2. Design of solid slab and RCC Tee beam bridges for IRC loading and reinforcement details
3. Design of pressed, rectangular and hemispherical bottomed steel tank – Staging – Detailed drawings
4. Design and drafting of Intz type water tank, Detailing of circular and rectangular water tanks
5. Design of plate girder bridge – Twin Girder deck type railway bridge – Truss Girder bridges – Detailed Drawings including connections

TOTAL : 60

TEXT BOOKS

1. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers

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Krishnagiri (Dt.), Tamil Nadu.

2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi publications Pvt. Ltd.

REFERENCES

1. Krishnamurthy, D., "Structural Design & Drawing – Vol- II", CBS Publishers & Distributors, Delhi
2. Krishnamurthy, D., "Structural Design & Drawing – Vol. III Steel Structures", CBS Publishers & Distributors, New Delhi

EXPT.	NAME OF THE EXPERIMENTS

LIST OF EQUIPMENTS

1. Models of Structures - 1 each.
7. Computers Pentium IV - 30 Nos.
8. Analysis and Design Software
9. - Minimum 5 user License - 1 No.
10. Auto CAD Software
11. - Multi user License - 1 No.

711CEP08 CONCRETE AND HIGHWAY LABORTARY

OBJECTIVE **0 0 3 2**

The experimental work involved in this laboratory should make the student understand the fundamental characteristics such as Specific Gravity, Normal Consistency Test, Setting Time, Compressive Strength Of Cement and aggregate.

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NO.	
	TESTS ON CEMENT
01	Specific Gravity Test For Cement
02	Normal Consistency Test For Cement
03	Setting Time Of Cement
04	Compressive Strength Of Cement
05	Fineness Test For Cement
	TESTS ON CONCRETE
06	Slump Test
07	Compaction Factor Test
08	Vee – Bee Consistometer Test
09	Compressive Strength Of Concrete
10	Split Tensile Strength Of Concrete
	TESTS ON AGGREGATE
11	Aggregate Crushing Test
12	Abrasion Test
13	Aggregate Impact Test
14	Shape Test – Flakiness Index, Elongation Index, Angularity Number
15	Specific Gravity And Water Absorption Test For Coarse Aggregate
	TESTS ON AGGREGATE
16	Specific Gravity Test For Bitumen
17	Penetration Test
18	Viscosity Test
19	Ductility Test
20	Flash & Fire Point Test
21	Softening Test

811CET01 BRIDGE ENGINEERING

OBJECTIVE **4 0 0 3**

At the end of this course the student shall be able to choose appropriate bridge structure and design it for given site conditions. Steel bridge, reinforced concrete slab bridges reinforced concrete girder bridges prestressed concrete bridges.

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1. INTRODUCTION 9

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders.

2. STEEL BRIDGES 9

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

3. REINFORCED CONCRETE SLAB BRIDGES 9

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

4. REINFORCED CONCRETE GIRDER BRIDGES 9

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

5. PRESTRESSED CONCRETE BRIDGES 9

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

TOTAL : 45

TEXT BOOKS

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990.
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 1996.

REFERENCES

1. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.

811 CEP05 SKILL DEVELOPMENT LABORATORY

OBJECTIVE: **0 0 3 2**

The experimental work involved in this laboratory should make the student understand the Field oriented knowledge in various Civil Engineering subjects.

List of Experiments:

7. Measurement of Sound Level
8. Standard Penetration Test
9. Cyclic Loading Test on RC Frame
10. Study of Performance Characteristics of Impulse Turbine
11. Study of Performance Characteristics of Reaction Turbine
12. Preparation of Map by using Total Station and GPS.

811CEP05 PROJECT WORK

OBJECTIVES

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

STRATEGY:

The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one externalexaminer.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating propermethodology.

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