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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

SYLLABUS REVISION

Name of School-School of Engineering

Department/Program-Civil Engineering/(BE & M.Tech)

2017-18 TO 2021-22

www.sssutms.co.in

Opp.Oilfed Plant, Bhopal-Indore Road,Sehore (M.P), Pin - 466001



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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]

Approved by Madhya Pradesh Private University Regulatory Commission

SH-18, Bhopal-Indore Road, Opposite Oilfed Plant, Pachama, Sehore (M.P.) Pin Code – 466001

Minutes of the Board of Studies Committee Meeting

Bachelor of Engineering

Dated :20.5.2017

The Board of Studies Committee Meeting was held in the room of Dean (SOE) at 2:30 pm on 20.5.2017 following members were present

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member
2. Dr. P. K Agrawal Professor MANIT Bhopal External Member
3. Dr. Satendra Singh Tomar
4. Dr. Ajay Swarup
5. Mr. Vivek Shukla
6. Mr. Kuldeep Shrivastava
7. Ms. Nidhi Gupta
8. Ms. Sana Khan
9. Mr. Sanjeet Kumar

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following agenda points were discussed and resolved

Agenda I approval of (i) SOE – III Semester Scheme and Syllabus as per CBCS.




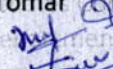
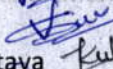
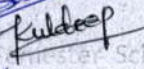

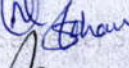
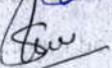
(ii) VII Semester Scheme and Syllabus CBCS.

Discussion (if any) Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion & Syllabus was prepared as per current demand in industries and was approved for fourth coming III semester CBCS & VII Semester Non-CBCS.

The Chairman Thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member 
2. Dr. P. K Agrawal Professor MANIT Bhopal External Member 
3. Dr. Satendra Singh Tomar 
4. Dr. Ajay Swarup 
5. Mr. Vivek Shukla 
6. Mr. Kuldeep Shrivastava 
7. Ms. Nidhi Gupta 
8. Ms. Sana Khan 
9. Mr. Sanjeet Kumar 

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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)
Scheme of Examination - CBCS Pattern

Academic Year 2017-2018

Branch : Civil Engineering

Semester - III

S.No.	Subject Code	Subject Name	Maximum Marks Theory				Maximum Marks		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assignments/ Quiz	End Sem. Practical I & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P			
1	MTH - 301	Computational Techniques	60	30	10	-	-	2	1	-	3	100	
2	CEC-302	Transportation Engineering-I	60	30	10	-	-	2	1	-	3	100	
3	CEC-303	Building Design & Drawing	60	30	10	30	20	2	1	2	4	150	
4	CEC-304	Engineering Geology	60	30	10	30	20	2	1	2	4	150	
5	CEC-305	Strength of Materials	60	30	10	30	20	2	1	2	4	150	
6	CEC-306	Energy Efficient & Green Building	60	30	10	30	20	2	1	2	4	150	
7	CEC-307	Programming Language in C	-	-	-	30	20	-	-	2	1	50	
TOTAL			360	180	60	150	100	12	6	10	23	850	



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MTH – 301 COMPUTATIONAL TECHNIQUES

UNIT I MATRICES

Eigenvalues and Eigenvectors of a real matrix , Characteristic equation , Properties of Eigenvalues and eigenvectors , Cayley-Hamilton Theorem , Diagonalization of matrices , Reduction of a quadratic form to canonical form by orthogonal transformation

UNIT II INFINITE SERIES

Sequences , Convergence of series , General properties , Series of positive terms , Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) , Alternating series , Series of positive and negative terms , Absolute and conditional convergence , Power Series , Convergence of exponential, logarithmic and Binomial Series.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

Limits and Continuity , Partial derivatives , Homogeneous functions and Euler's theorem , Total derivative , Differentiation of implicit functions , Change of variables , Partial differentiation of implicit functions , Taylor's series for functions of two variables . Errors and approximations , Maxima and minima of functions of two variables

UNIT IV IMPROPER INTEGRALS

Improper integrals of the first and second kind and their convergence , Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions , Properties , Evaluation of integrals using Beta and Gamma functions , Error functions.

UNIT V MULTIPLE INTEGRALS

Double integrals , Change of order of integration , Area enclosed by plane curves , Triple integrals , Volume of Solids , Change of variables in double and triple integrals , Area of a curved surface.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd.,




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CEC(302)-TRANSPORTATION ENGINEERING-I

UNIT I Introduction- Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort.

- i) Rails: types, welding of rails, wear and tear of rails, rail creep.
- ii) Sleepers: types and comparison, requirement, sleeper density.
- iii) Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.
- iv) Ballast: Requirement, various materials used, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track.

UNIT II Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking:

Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipments, layouts, marshalling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

UNIT-III Bridge Site Investigation And Planning; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data: essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges. : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls.

Unit-IV Bridge Foundations, Construction, Testing and Strengthening of Bridges : Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants. inspection and Data collection, strengthening of bridges, Bridge failure.

UNIT-V Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts 2, Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

References

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
5. Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons.
6. Railway Track by K.F. Antia
7. Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons
8. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
9. Railway, Bridges & Tunnels by Dr. S.C. Saxena .


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CEC(303)-BUILDING DESIGN & DRAWING

UNIT-I Drawing Of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UNIT-II Building Planning – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

UNIT-III Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT-IV Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc.

UNIT-V Perspective Drawing – Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.

References

1. Malik & Meo; Building Design and Drawing By
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of AutoCAD for preparation of drawings.




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CEC(304)-ENGINEERING GEOLOGY

UNIT-I Introduction and Physical Geology: Objects and scope of geology. The crust and the interior of the earth, origin and age of the earth, Sub-aerial and sub-terrain weathering, denudation and deposition, wind, river, glacial and marine erosion, volcanoes, soil formation, soil profile, geological classification of soil and concept of earthquake Plate- tectonics.

UNIT-II Mineralogy and Crystallography: Fundamentals of mineralogy, study of common rock forming minerals, ores and minerals of economic importance to civil engineering., elements of crystallography and introduction to crystal systems.

UNIT-III (1) Petrology: Composition of earth's crust, study of igneous, sedimentary and metamorphic rocks and their formation, characteristics classification, Rocks of civil engineering importance.

(2)Geology of India: Physical features of India, Brief geological history of India, occurrence of important ores and minerals in India.

UNIT-IV Structural Geology: Structures related to rocks, Dip, Strike and outcrops, Classification and detailed studies of geological structures i.e. folds, Faults, Joints, Unconformity and their importance in Civil Engineering.

UNIT-V Applied Geology: Introduction to applied geology and its use in civil engg., properties of rocks, selection of sites for roads, bridges, dams, reservoirs and tunnels. Prevention of engineering structures from seismic shocks, stability of hill sides, water bearing strata, artesian wells, Use of remote-sensing techniques in selection of above sites.

Reference:

1. Prabin Singh – “Engineering and General Geology”
2. Gulati ; Geotechnical Engineering; TMH
3. P.K. Mukerjee – “ A text Book of Geology”
4. S.K. Garg – “ A text Book of Physical and Engineering Geology”

List of Experiment (Expandable)

1. Identification of simple rock forming minerals and important ores.
2. Identification of rock
3. Simple map Exercises.
4. Field Visit / Geological Excursion.


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CEC(305)-STRENGTH OF MATERIALS

UNIT-I Simple Stress and Strains: Concept of Elastic body, stress and Strain, Hooke's law, various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains, Mohr's circle of stresses, Combined Bending and Torsion, Theories of failure.

UNIT-II Bending & Deflection: Theory of simple bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in Beams. Deflection of beams: Double Integration Method. Conjugate Beam Method, Macaulay's Method Area Moment Method.

UNIT-III Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Spiral Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.

UNIT-IV Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

UNIT-V Columns and Struts: Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Rankine formulae, Eccentric loading on columns.

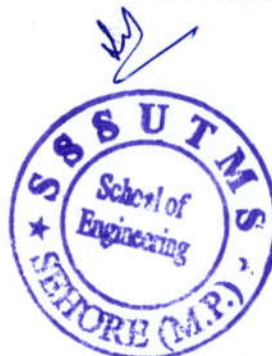
Reference

1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials;
3. Negi; Strength of materials; TMH
4. Sadhu Singh; Strength of Materials, ,
5. Ramamrutham; Strength of Materials, ,
6. Subramaniam; Strength of Materials; R; Oxford
7. National Building Code of India, Part-IV

List of Experiments –

The experimental work to cover tension, compression, bending and impact test etc. on steel, cast iron, RCC and timber, Fire Resistant Test of Structures and Combustibility of Building Materials Test as per I.S.I. and other experiments based on the syllabus.


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CEC(306)-ENERGY EFFICIENT & GREEN BUILDING

UNIT-I Energy Efficient Green Buildings - The green Building concept, rating systems in India and world, GRIHA, LEED, etc. , some top green buildings in the world, sustainable practices used in the design and construction phases of Green Buildings, Energy Efficient Solar Homes & Buildings, Energy Savings in Homes, IGBC certification.

UNIT-II Energy Conscious Buildings – Introduction, Climate and Buildings In India, Factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design ,Urban climate ,Microclimate, Tools for analyzing weather data, illustrative example. National Building Code, Energy Conservation Building Codes, Key barriers to green building in India, Overcoming the barriers, implementation approach, etc.

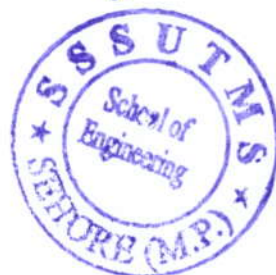
UNIT-III Principles Of Energy Conscious Design Of Buildings In India – Introduction Building Envelope, Site, Orientation, Building Configuration, Building Components, Passive Heating, Direct Gain ,Indirect Gain, Thermal storage wall, Roof top collectors, Isolated Gain, Solarium (Attached greenhouse/ sunspace), Passive Cooling, Ventilation Cooling, Cross ventilation, Wind tower, Induced ventilation, various types of cooling system, Earth Coupling, Earth-air pipe system , Basic Principles & Systems of Day-lighting , Building Materials ,Embodied Energy & Alternative Building Materials.

UNIT –IV Thermal Performance Of Buildings - Introduction, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation ;Example Computer-based Tools DESIGN GUIDELINES: Description of Buildings, Methodology, General Recommendations, Specific Guidelines.

UNIT-V Zero Energy Buildings - Opportunities and challenges in designing a Net zero building ,Energy efficient solar buildings, Design aspects ,Climatic zones ,Passive design features and their advantages, Sunshades, Window design, Double glazed windows Building insulation, Evaporative cooling, Landscaping, Surface to volume ratio Passive heating ,Earth air tunnel ,Solar chimney, Wind tower, Applicable passive features for various climatic zones, Energy-efficient lighting, Indoor lighting ,Outdoor lighting ,Energy efficient air conditioners, Renewable energy systems, Solar water heating system Building integrated PV system.

References –

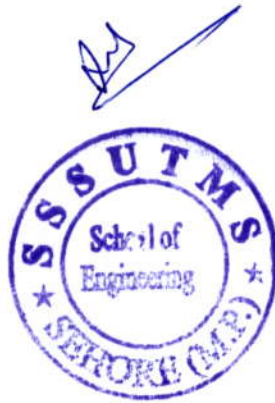
1. L. Zagreus, D. Lehrer, and C. Huizenga. 2006. Occupant Satisfaction with Indoor Environmental Quality in Green Buildings.
2. ASHRAE Energy Standard 90.1-2010 for Buildings Except Low-Rise Residential. Washington, D.C.
3. D. Winiarski, M. Yazdani, J. Huang, and D. Crawley. 2011. *U.S. Department of Energy Commercial Reference Building Models of the National Building Stock*.
4. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling .




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List of experiments:-

1. Detect and measure the turbulent airflow around test structures.
2. Using the thermal mass of the building to lighten the load of an air conditioner.
3. Using passive solar design to cool and heat a house.
4. Determine if designing a different roof helps with regular ventilation.
5. Determine if energy costs are reduced by painting a slope roof white.
6. Energy saving at home- the thermal envelope.

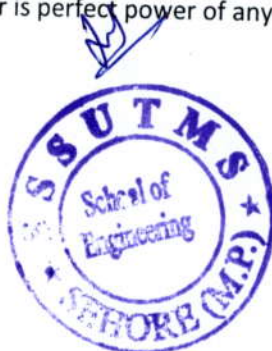



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CEC(307)-PROGRAMMING LANGUAGE IN C

List of Experiments

1. WAP to perform arithmetic operations (Addition, Subtraction, Multiplication, Division) on two numbers.
2. WAP to calculate gross salary of an employee [using formula: $gross_sal = basic_sal + hra + da$].
3. WAP to calculate area of circle.
4. WAP to evaluate marks of student for 3 subjects, calculate percentage and display their grades. Marks grades CASE -1: 90-100 A CASE -2: 80-89 B CASE -3: 65-79 C CASE -4: Otherwise D
5. WAP to determine sum of odd series from 1 to N
6. WAP to calculate factorial of a number.
7. WAP to print Fibonacci series up to N. [E.g. - 0 1 1 2 3 5.....]
8. WAP to identify whether given number is prime or not.
9. WADF to identify whether given number is even or odd.
10. WADF to print whether given year is leap year or not.
11. WADF to check whether the 5 digit number is palindrome or not [A palindrome number or numeral palindrome is a number that remains the same when its digits are reversed. Like 16461, for example, it is "symmetrical".].
12. WADF to check whether 5 number entered is Armstrong number or not.[An Armstrong number is an n-digit number that is equal to the sum of the nth powers of its digits. Like 153]
13. WAP to find the sum of the digits of a number.
14. WAP to input 3 sides of triangle and identify the type of triangle.
15. WAP to input 5 digit numbers and find the sum of the first and last digit.
16. WAP to check whether the number is power of 2 or not.
17. WAP to find out GCD of two numbers.
18. WAP to check whether given number is perfect power of any natural number




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Sri Satya Sai University of Technology & Medical Sciences, Shore (M.P)
Scheme of Examination - CBCS Pattern

Academic Year 2018- 2019

Branch : Civil Engineering

Semester - VII

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot				Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P			
1	CEC- 701	Quantity Surveying & Costing	60	30	10	30	20	2	1	2	4	150	
2	CEC- 702	Advanced Structural Design (R.C.C.)	60	30	10	30	20	2	1	2	4	150	
3	CEC- 703	Environmental Engineering - II	60	30	10	30	20	2	1	2	4	150	
4	CEC- 704	Department Elective-V	60	30	10			2	1		3	100	
5	CEC- 705	Department Elective-VI	60	30	10			2	1		3	100	
6	CEC- 706	Open Elective	60	30	10			2	1		3	100	
7	CEC - 707	Industrial Training - II					100			4	2	100	
TOTAL			360	180	60	90	160	12	6	10	23	850	
Department Elective V-CEC -704			CEC -704 (A) Design of Hydraulic Structures				CEC -704 (B) Urban Transportation Planning						
Department Elective VI-CEC-705			CEC -705 (A) Traffic Engineering				CEC-705(B) Cost Effective & Eco Friendly Construction						
Open Elective -CEC- 706			CEC -706 (A) Earthquake Resistant Design of Structures				CEC -706 (B) Experimental Stress Analysis						



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CEC-701 Quantity Surveying & Costing

Unit – I

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit – II

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

Unit – III

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

Unit – IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

Unit – V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

Suggested Books:

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

Practical & Sessional Works:

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.



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CEC- 702 Advanced Structural Design (RCC)

Unit - I

Design of Multistory Buildings - Sway and nonsway buildings, Shear walls and other bracing elements.

Unit II

Earth Retaining Structures: Cantilever and counter fort types retaining walls.

Unit - III

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

Unit - IV

Silos and Bunkers

Unit - V

T-beam & Slab bridges- for highway loading (IRC Loads).
Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

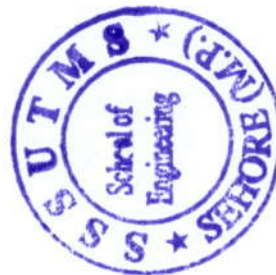
PRACTICAL & SESSIONAL WORK: Laboratory work will be based on the course of RCC as required for The design of engineering projects.

Suggested Books: -

1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.
7. Pre stresses concrete – T.Y. Lin


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CEC 703 Environmental Engineering - II

Unit - I

Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

Unit -II

Characteristics and analysis of waste water, rcycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.

Unit -III

Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

Unit - IV

Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

Unit - V

Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil
Laboratory work shall be based on the topics of environmental engineering I & II and consist of experiments of water and waste water quality as per facility available in the institution.

List of Experiment

1. To study the various standards for waste water
2. To study the sampling techniques for waste water
3. To determine the alkalinity in water sample
4. To determine the acidity in water sample
5. Determination of Dissolved Oxygen in the water and waste water sample
6. Determination of Biological Oxygen demand of a waste water sample


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7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method

Reference Books :-

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
3. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
4. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
5. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
6. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
7. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi


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CEC-704(A) Departmental Elective V

Design of Hydraulic Structures

Unit - I

Reservoir Planning: Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir.

Earth Dams: Types, causes of failure and design criteria, soils suitability for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

Unit - II

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, practical profile, evaluation of profile by method of zoning, foundation treatment, construction joints, galleries in gravity dams.

Unit - III

Spillways: Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways. Design of outlets and rating curves
Energy dissipaters: Principles of energy dissipation Energy dissipaters based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles. Design of canal regulating structures, Design of Channel transitions,

Unit - IV

Structures on Pervious formations: Bligh's creep theory, limitations, Khosla's theory of independent variable, Khosla's corrections, Design of Weir and Barrages: design of waterways and crest levels, design of impervious floors and protection works.

Unit - V

Canal Structures and Hydropower Plants: Design of canal falls, Regulators, Cross drainage works, Introduction of Hydropower development, general features of hydro-electric schemes, selection of turbines.

Reference Books: -

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey B.B. Lal
5. Water Power Engineering by Dandekar


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CEC-704(B) Departmental Elective V

Urban Transportation Planning

Unit- I: Transportation Planning Process: Definition of Study Area; Zoning Principles; Types of Surveys: Home Interview Studies, Commercial Vehicle Surveys, Road Side Interview Methods, Public Transport Studies, Land Use Inventory; O-D Matrix and Desire Line Diagram. Accident Studies & Mass Transportation: (i) Accident Studies : Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Unit – II: Trip Generation: Four Stage UTP Process; Travel Demand Models; Sequential Models and Direct Demand Models; Factors affecting Travel Demand; Trip Generation; Multiple Regression Analysis; Category Analysis; Aggregate and Disaggregate Models. TRIP Distribution: Trip Distribution Models- Growth Factor Models: Uniform Growth Factor, Average Growth Factor, Fratar Method and Furness Method; Limitations of Growth factor Models; Gravity Model – Calibration of Gravity Model.; Opportunity Models. Traffic Assignment: Purpose of Traffic Assignment; Assignment Techniques-All-or-Nothing Assignment, Multiple Route Assignment, Capacity restraint assignment; Use of Diversion Curves in Assignment.

Unit –III: Mode Split: Factors affecting Mode Split; Pre–distribution Mode Split; Post Distribution Mode Split; Advantages and Disadvantages; Probit, Logit and Discriminant Analysis in Mode Split. Land use and transportation system: Urban system components, Concept and definitions, criteria for measuring and comparing urban structure, land use and transportation.

Unit – IV: Pavement Design Factors: Design wheel load, strength characteristics of pavement materials, climatic variations, traffic - load equivalence factors and equivalent wheel loads. Flexible Pavements Design: Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory ,Burmister's two layered theory, methods of design, Group Index method, CBR method, IRC method, AASHTO method, Burmister's method and North Dakota cone method. Applications of pavement design software.

Unit –V: Rigid Pavements: Evaluation of sub grade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions. Rigid Pavement Design: Types of joints and their functions, joint spacing; design of CC pavement for roads, highways and expressways as per IRC, AASHTO, design of joints. Design of continuously reinforced concrete pavements. Reliability; Use of software for rigid pavement design.


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References

1. Adib Kanafani. (1983). Transportation Demand Analysis. Mc Graw Hill Series in Transportation, Berkeley.
2. Hutchinson, B.G. (1974). Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York.
3. John W. Dickey. (1975). Metropolitan Transportation Planning. Mc Graw Hill Book Company, New York.
4. Papacostas, C.S., and Prevedouros, P.D. (2002). Transportation Engineering and Planning. 3rd Edition, Prentice - Hall of India Pvt Ltd., 318-436.
5. Khisty C.J., Transportation Engineering - An Introduction, Prentice Hall, India, 2002.
6. Yoder and Witczak, Principles of Pavement Design, John Wiley and Sons
7. Yang. H. Huang, Pavement Analysis and Design, Second Edition, Prentice Hall Inc.
8. Rajib B. Mallick and Tahar El-Korchi, Pavement Engineering – Principles and Practice, CRC Press (Taylor and Francis Group)
9. W. Ronald Hudson, Ralph Haas and Zeniswki , Modern Pavement Management, Mc Graw Hill and Co Academic Session 2016-17
10. Relevant IRC Codes
11. Bruton M J (1981), "Introduction to transportation planning", Hutchinson of London
12. Dickey J W (1980), "Metropolitan Transportation Planning", Tata McGraw Hill
13. Principles of Transportation Engineering : P. Chakraborty and A. Das
14. Fundamentals of Transportation Engineering: : C.S. Papacoastas
15. Traffic Engineering and Transport Planning: : L.R. Kadyal


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CEC- 705(A) Departmental Elective VI

Traffic Engineering

Unit -I.

Traffic Characteristics: (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

Unit -II.

Traffic Studies: (i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

Unit -III.

Traffic Operations and Control: (i) Traffic regulations and various means of control. (ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

Unit -IV.

Street Lighting : (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

Unit -V.

Accident Studies & Mass Transportation: (i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Reference Books :-

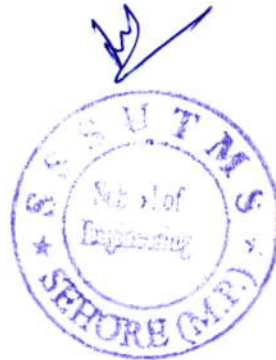
1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S. Smith & F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R. Drew, Traffic Flow Theory
5. W.R. Mchshne and R.P. Roess "Traffic Engg"
6. Wohl & Martin, Traffic System Analysis for Engineering & Planners

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3. Non-conventional Energy Resources –D S Chauhan and S K Sreevasthava – New Age International Publishers
4. Buildings How to Reduce Cost – Laurie Backer - Cost Ford
5. Lynne Elizabeth, Cassandra Adams Alternative Construction : Contemporary Natural BuildingMethods ", Softcover, Wiley & Sons Australia, Limited, John,2005
6. Givoni, "Man, Climate, Architecture, Van Nostrand, New York, 1976.
7. Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery,John Wiley & Sons,2005.
8. Eugene Eccli- Low Cost, Energy efficient shelter for owner & builder, Rodale Press, 1976


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CEC-706(A) Open Elective

Earthquake Resistant Design of Structures

UNIT I

Seismic Strengthening of Existing Buildings: Cases Histories-Learning from earthquakes, seismic strengthening procedures.

UNIT II

Torsion & Rigidity: Rigid Diaphragms, Torsional moment, Center of mass and center of rigidity torsion effects. Lateral Analysis of Building Systems: Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear wall-frame combination, examples.

UNIT III

Concept of Earthquake Resistant Design: Objectives of seismic design, Ductility, Hysteric response & energy dissipation, response modifications factor, design spectrum, capacity design, classification of structural system, IS code provisions for seismic design of structures, multi-storied buildings, design criteria, P-A effects, storey drift, design examples ductile detailing of RCC structures.

UNIT IV

Seismic Design of Special Structures: Elevated liquid storage tanks, Hydrodynamic pressure in tanks, stack like structures, IS-1893 code provisions for bridges; Superstructures, substructures, submersible bridges, dams; Hydrodynamic effect due to reservoir, concrete gravity dams.

UNIT V

Engineering Seismology: Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients.

Reference Books:

1. Chopra A.K., Dynamics of Structures', Theory & Applications to Earthquake Engineering, Prentice Hall India, New Delhi-1995
2. Clough & Penzien, Dynamics of Structures , McGraw Hill Book CO. Inc.
3. Paz M, Structural Dynamics, Van Nostrand Reinhold, New York
4. Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.
5. IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
6. IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.


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CEC-706(B) Open Elective

Experimental Stress Analysis

Unit- I

Strain Measurement: Strain gauges-theory of resistance strain gauges, basic types and constructions, gauge configurations and their uses, gauge materials and requirements, mounting techniques, strain gauge circuitry, reduction of strain gauge data, special applications such as high temperature, fatigue and creep.

Displacement Measurement: Mechanical dial gauges, linear variable differential transformers, linear resistance potentiometers.

Unit- II

Stress and Force Measurements: Load cells-types and sizes, embedded stress meters and plugs, proving rings.

Temperature Measurements: Thermo – couples and thermistors, thermistor type thermometers.

Unit- III

Vibration Measurements: Vibration pickups for measuring displacements, velocities and accelerations-principles of operations phase distortions, sensitivity, practical applications.

Unit- IV

Photoelasticity: Photoelastic theory, Photoelastic equipment, Photoelastic model materials, reduction of Photoelastic data, extrapolation to the prototype, practical applications.

Smart Materials: Characteristics, piezoelectric materials, shape memory alloys, self healing materials, practical applications.

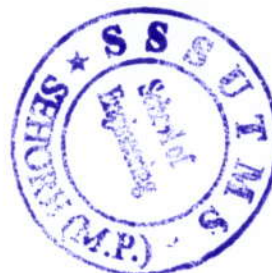
Unit- V

Measurement Devices: UPV method, radar and dynamic response testing, radiography and radiometry, infrared thermography, X-Ray diffraction, SEM techniques.

Suggested books:

1. Dally, J.W. and Riley, W.F., "Experimental Stress Analysis", McGraw-Hill
2. Sabmis, G.J.et al., "Structural Modeling and Experimental Techniques", Prentice – Hall.
3. Bungey, J.H.and Millard, S.G., "Testing of Concrete in Structures", Blackie Academic & Professional.
4. Encyclopedia of Smart materials, John Wiley & Sons.


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CEC-707 Industrial Training - II

Each candidate should work on project Assigned or Approved by Civil Engg Department. Student submit report to department.




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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]

Approved by Madhya Pradesh Private University Regulatory Commission

SH-18, Bhopal-Indore Road, Opposite Oilfed Plant, Pachama, Sehore (M.P.) Pin Code – 466001

Minutes of the Board of Studies Committee Meeting

Bachelor of Engineering

Dated :10.11.2017

The Board of Studies Committee Meeting was held in the room of Dean (SOE) at 2:30 pm on 10.11.2017 following members were present

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member
2. Dr. P. K Agrawal Professor MANIT Bhopal External Member
3. Dr. Satendra Singh Tomar
4. Dr. Ajay Swarup
5. Mr. Vivek Shukla
6. Mr. Kuldeep Shrivastava
7. Ms. Nidhi Gupta
8. Ms. Sana Khan
9. Mr. Sanjeet Kumar

Minutes of the Board of Studies Committee Meeting

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following agenda points were discussed and resolved

Agenda I approval of (i) SOE –IV Semester Scheme and Syllabus as per CBCS.



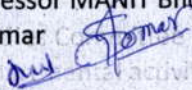


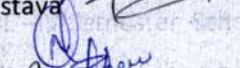


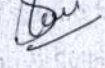
(ii) VIII Semester Scheme and Syllabus CBCS.

Discussion (if any) Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion & Syllabus was prepared as per current demand in industries and was approved for fourth coming IV semester CBCS & VIII Semester Non-CBCS.

The Chairman Thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member 
2. Dr. P. K Agrawal Professor MANIT Bhopal External Member 
3. Dr. Satendra Singh Tomar 
4. Dr. Ajay Swarup 
5. Mr. Vivek Shukla 
6. Mr. Kuldeep Shrivastava 
7. Ms. Nidhi Gupta 
8. Ms. Sana Khan 
9. Mr. Sanjeet Kumar 

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Sri Satya Sai University of Technology & Medical Sciences, Shore (M.P)
Scheme of Examination - CBCS Pattern

Academic Year 2017-2018

Branch : Civil Engineering Semester - IV



S.No.	Subject Code	Subject Name	MAXIMUM MARKS THEORY			MAXIMUM MARKS (Practical Slot)		PERIODS/ HOUR / WEEK			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record / Assignment / Quiz / Presentation	L	T	P		
1	CEC-401	Fluid Mechanics-I	60	30	10	30	20	2	1	2	4	150
2	CEC-402	Concrete Technology	60	30	10	-	-	2	1	-	3	100
3	CEC-403	Surveying	60	30	10	30	20	2	1	2	4	150
4	CEC-404	Construction Materials & Techniques	60	30	10	30	20	2	1	2	4	150
5	CEC-405	Hydrology	60	30	10	-	-	2	1	-	3	100
6	CEC-406	BUILDING CONSTRUCTION MATERIALS	60	30	10	30	20	2	1	2	4	150
7	CEC-407	PROGRAMMING IN C++	-	-	-	30	20	-	-	2	1	50
TOTAL			360	180	60	150	100	12	6	10	23	850




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CEC-401 FLUID MECHANICS-I

Unit 1- PROPERTIES OF FLUID :- Fluid and continuum, Physical properties of fluids. Newtonian and non-Newtonian fluids. Pressure transducers, Pascal's law, pressure variation in a fluid at rest, Hydrostatic law, Manometer, Hydrostatic force on submerged body, Buoyancy and Flotation.

Unit 2- FLUID KINEMATICS :- Lagrangian and Eulerian approach, Type of fluid flow. Continuity equation, acceleration of a fluid particle, motion of fluid particle along curved path, Normal and tangential acceleration, Rotation and Vorticity, circulation, stream and potential function, flow net. Liquid in relative equilibrium.

Unit 3- FLUID DYNAMICS :- Euler's equation of motion along a streamline, Impulse momentum equation, Momentum of Momentum equation, Kinetic energy and momentum correction factor, forces on fixed and moving vanes and applications. Fluid Measurements, Velocity measurement, flow measurement.

Unit 4- LAMINAR FLOW:- Reynolds's experiment, Hagen-Poiseuille Equation, flow of viscous fluids between two parallel plates, Drop of pressure head. Effect of turbulence, Expression for loss of head due to friction in pipes. Loss of energy in pipes, Hydraulic gradient and total energy line, pipe in series and parallel, equivalent pipe power transmission through pipe, water hammer in pipes.

Unit 5-DIMENSIONAL ANALYSIS :- Methods of dimensional analysis, Rayleigh's method, Buckingham's theorem. Model analysis: Dimensionless number and their significance, model laws, Type of models, scale effect in model, limitation of hydraulic similitude.

REFERENCE BOOKS :-

1. Fluid Mechanics- Yunush A. Cengel, John M. Cimbala- TMH, Delhi
2. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar– Kataria & Sons – New Delhi
3. A text of Fluid Mechanics – R. K. Rajput – S. Chand & Company Ltd., Delhi
4. Fluid Mechanics & Hydraulics Machines-R.K.Bansal-Laxmi Publications, Delhi
5. Engineering Fluid Mechanics –K.L. Kumar, Eurasia Publication House, Delhi
6. Mechanics of Fluid – B.S. Massey – English Language Book Society (U.K.)
7. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas- TMH, Delhi

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LIST OF EXPERIMENTS :- (Note: Ensure to conduct at least 10 experiments from the list)

1. To determine the meta-centric height of a ship model.
2. To verify Impulse Momentum Principle.
3. To calibrate a Venturimeter and study the variation of coefficient of discharge
4. To calibrate an orifice-meter.
5. Flow measurement using Pitot tube.
6. To determine the hydraulic coefficients (C_c , C_d and C_v) of an orifice.
7. To determine the coefficient of discharge of a mouth piece.
8. To study the variation of friction factor for pipe flow.
9. To determine the head loss for a sudden enlargement.
10. To determine the head loss for a sudden Contraction.
11. To determine of head loss in various pipe fittings.
12. To study of Reynolds experiment for demonstration of stream lines & turbulent flow
13. To study the characteristics of a centrifugal pump




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CE-402 CONCRETE TECHNOLOGY

Unit 1 : Introduction : classification of concrete , properties of concrete , grade of concrete , advantages and disadvantages of concrete concept of concrete ,Portland cement ,types of cement ,cement classification ,storage of cement ,classification of aggregate , testing of aggregate , quality of mixing water , curing water.

Unit 2: Properties of concrete: introduction, properties of fresh concrete, compaction of concrete, curing of concrete, properties of hardened concrete, strength characteristics, shrinkage, creeping of concrete, durability of concrete, fire resistance, micro cracking of concrete.

Unit 3: Quality control of concrete and production: Introduction, field control, advantages of quality concrete, measure of variability, batching of materials, mixing of concrete material, transportation of concrete, ready mix concrete, placing of concrete, finishing and repair of concrete, formwork, hot and cold weather condition, testing of concrete.

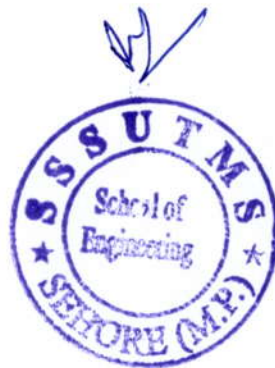
Unit 4: concrete mix design: method of concrete mix design, trial and adjustment method of mix design, mix design according of Indian standard (IS), rapid method of mix design, concrete mix with surkhi and other material.

Unit 5: Special concrete: Light weight concrete, ultra-light weight concrete, mass concrete, vacuum concrete, roller compacted concrete, waste material based concrete, high density concrete, nuclear concrete, self- compacting concrete, aerated concrete.

REFERENCE BOOKS:

- 1 Ml Gambhir - Concrete Technology- Tmh
- 2 A.M. Nobile-Concrete Technology- Elbs London
- 3 Varshney Rs-Concrete Technology-Oxford & Ibh
- 4 Sinhasn- R/F Concrete Technology-Tmh
- 5 Mohan Rai & M.P.Singh –Advances In Building Material & Construction
- 6 Jackson N- Civil Engineering Materials


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CEC-403 SURVEYING

Unit 1: Fundamental concept and horizontal measurement: Introduction, definition, surveying, classification of survey, principle of survey, practice of surveying, surveying character of work, types of errors, chain surveying, chain, tapes, accessories for chaining, line ranger, cross staff, optical square, prism square, running survey lines, linear measurement with chain.

Unit 2: Compass surveying and theodolite: Introduction, definition, types of compass, temporary adjustment of compass, designation of bearing, reduced bearing, force bearing and back bearing, calculation of included angle from bearing, calculation of bearing from included angle, introduction of theodolite, classification, adjustment of theodolite, theodolite as a level, optical theodolite, electronic theodolite, measurement of vertical and horizontal angles.

Unit 3: Curves: classification and use, element of circular curves, calculation, setting out curves by offsets and by theodolite, compound curve, reverse curve, transition curves, cubic spiral and lemniscate, vertical curves, setting out.

Unit 4: Total station surveying: Introduction, features of total- station, setting up and orienting of total station, on – board software, electronic data recording, summary of total station characteristics, field procedures for total station in topographic survey.

Unit 5: hydrographic surveying: sounding method of observation, computation and plotting, principles of photographic surveying, aerial photography , tilt and height distortions, remote sensing, contouring, image processing system.

REFERENCE BOOKS:

- 1.Duggal, Surveying volume 1 and 2, TMH
2. Dr B .C . Punmia , vol.1 and 2
- 3.K.R.Arora, Surveying vol 1 and 2
- 4.Basak, Surveying and leveling , TMH

LIST OF EXPERIMENTS:

- 1.Theodolite Traversing
- 2.Compass Surveying
- 3.Total Station Surveying
- 4.Curve Setting By Different Method



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CEC-404 CONSTRUCTION MATERIAL & TECHNIQUES

Unit 1. Construction Materials :- Cement, Classification of cement, stones description, timber ,seasoning and treatment of timber, engineering uses of timber ,brick and tiles ,manufacturing ,characteristics ,classification and uses steel uses ,advantage and disadvantage.

Unit 2. Advantage construction materials :- Concrete Introduction ,uses ,advantage and disadvantage. Mortar , Introduction uses ,advantage and disadvantage, metals, ferrous metals and non-ferrous metals and alloy's , Glass ,Plastics. Construction techniques

Unit 3 Foundation:- Type of soil ,bearing capacity , soil slablisation and improvement of bearing capacity , settlement and safe limits .Pile foundation , under reamed piles , raft foundation , grillage foundation , well foundation , well foundation , spread foundation , wall footings, hyperbolic parabolied footing , brick arch foundation, simple methods of foundation design , damp proof courses, repairs techniques for foundations.

Unit-4 Masonry and Walls :- Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry block, Hollow concrete block, plastering and pointing, white and color washing, distempering, dampness and its protection, Design of hollow block masonry walls. Doors, Windows and Ventilators: Types based on material etc., size location, fittings, construction sunshades, sills and jambs, RCC doors/windows frames. Stairs types, rule of proportionality etc., Repairs techniques for masonry, walls, doors & windows.

Unit-5 Floors and Roofs : Types, minimum thickness, construction, floor finishes, Flat roofs, RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing .Services : Water supply & Drainage, Electrification, Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low cost housing., Repairs techniques for floors & roofs.

REFERENCES:

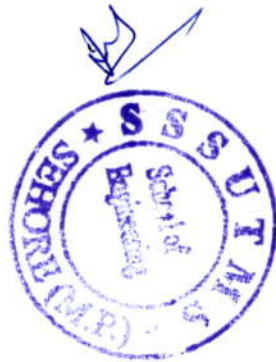
1. Mohan Rai & M.P. Jai Singh; Advance in Building Materials & Construction.
2. S.C. Rangwala; Engineering Materials.
3. Sushil Kumar; Building Construction.
4. B.C. Punmia; Building Construction.
5. Building Construction, Metchell
6. Construction Technology, Chudley R.
7. Civil Engineering Materials, N. Jackson. 8. Engineering Materials, Surendra Singh.

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LIST OF EXPERIMENTS:

1. Tests on Bricks
2. Tests on Aggregates
3. Tests on Cement
4. Determination of compressive strength of concrete with different cement grades.
5. Determination of workability of concrete by slump test
6. Determination of workability by compacting factor apparatus.
7. Determination of workability by Vee Bee consistometer.
8. Nondestructive testing of concrete by Rebound hammer test
9. Nondestructive testing of concrete by ultrasonic Method.
10. Test for the effect of admixtures on the concrete compressive strength
11. Testing of microconcrete
12. Design of concrete mix.




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CEC-405 HYDROLOGY

Unit 1 Precipitation

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

Unit 2 Abstraction from precipitation

Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

Unit 3 Hydrographs

Factors affecting Hydrograph – Baseflow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

Unit 4 Floods and flood routing

Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control

Unit 5 Ground water hydrology

Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

REFERENCES:

1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2000
2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd., 2000.



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CEC-406 BUILDING CONSTRUCTION MATERIALS

Unit-I: Masonry Construction:- Introduction, various terms used, stone masonry-Dressing of stones, Classifications of stone masonry, safe permissible loads, Introduction to green building concept and methods, Brick masonry-bonds in brick work, laying brick work, structural brick work-cavity and hollow walls, reinforced brick work, Defects in brick masonry, composite stone and brick masonry, glass block masonry.

Unit-II: Cavity and Partition Walls:- Advantages, position of cavity, types of non-bearing partitions, constructional details and precautions, construction of masonry cavity wall.

Unit-III: Damp-Proofing and Water-Proofing:- Defects and causes of dampness, prevention of dampness, materials used, damp-proofing treatment in buildings, water- proofing treatment of roofs including pitched roofs.

Unit-IV: Limes, cement and mortars:- Classification of lime, manufacturing, artificial hydraulic lime, pozzolona, testing of lime, storage of lime, cements composition, types of cement, manufacturing of ordinary portland cement, testing of cement, special types of cement, storage of cement.

Unit-V: Timber:- Classification of timber, structure of timber, seasoning of timber, defects in timber, fire proofing of timber, plywood, fiber boards, masonite and its manufacturing, important Indian timbers.

REFERENCES:

- 1 Building Construction, Sushil Kumar, Standard Pub., N. Delhi
- 2 Building Material, Rangawala
- 3 Construction Engineering, Y.S. Sane
- 4 Building Construction, Gurcharan Singh, Standard Pub., N. Delhi.



[Signature]
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CEC-407 Programming in C++

Unit-1

C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor and destructor functions.

Unit-2

Operator and function overloading, pointers, pointers to base and derived classes inheritance, public and Private inheritance, multiple inheritance.

Unit-3

Polymorphism, virtual functions, abstract base classes and pure virtual function, friend function, early and late binding.

Unit-4

C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling: try, catch and throw.

Unit-5

UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

REFERENCES:

1. Lafore R. "Object Oriented Programming in C++", Galgotia Pub.
2. Lee "UML & C++ a practical guide to Object Oriented Developmented i. Pearson.
3. Schildt "C++ the complete reference 4ed,2003.
4. Hans Erit Eriksson "UML 2 toolkit" Wiley.
5. Balagurusawmy "Object Orienter Programming with C++".
6. B.G., Boach "Object Oriented Analysis & Design with Applications", Addison




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Sri Satya Sai University of Technology & Medical Sciences, Shore (M.P)

Scheme of Examination - CBCS Pattern

Academic Year 2018-2019

Branch : Civil Engineering

Semester - VIII

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot				Maximum Marks (Practical Slot)		Periods/ hour/ week				Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P				
1	CEC- 801	Geo. Technical Engg. -II	60	30	10	30	20	2	1	2	4	150		
2	CEC- 802	Advanced Structural Design II (Steel)	60	30	10	30	20	2	1	2	4	150		
3	CEC- 803	Department Elective-VII	60	30	10			2	1		3	100		
4	CEC- 804	Department Elective-VIII	60	30	10			2	1		3	100		
5	CEC- 805	Open Elective	60	30	10			2	1		3	100		
6	CEC- 806	Industrial Training Project-II				50	100			8	4	150		
7	CEC- 807	General Proficiency					100		2		2	100		
TOTAL			300	150	50	110	240	10	7	12	23	850		
Department Elective VII-CEC- 803			CEC- 803 (A) Construction Planning & Management				CEC- 803 (B) Structural Dynamics & Earthquake Engineering							
Department Elective VIII-CEC-804			CEC- 804 (A) Pavement Design				CEC- 804 (B) Air Quality Monitoring & Control							
Open Elective -CEC- 805			CEC-805(A) Advance Water Resources Engg				CEC-805 (B) Environmental Impact Assessment							

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CEC 801 – Geo. Technical Engg. -II

Unit - I

Shallow Foundations: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I. S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

Unit - II

Deep Foundation: Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under-reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

Unit - III

Soil Improvement Techniques: Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness. Soil stabilisation: Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilisation and sabilisation by grouting. Geo-synthetics, types, functions, materials and uses.

Unit - IV

Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit - V

Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

LABORATORY WORK: Laboratory work will be based on the course of Geotech. Engg. I & II as required for soil investigations of engineering projects and not covered in the lab. Work of Geotech. Engg. I

LIST OF EXPERIMENTS

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration of Plate Load Test SPT & DCPT

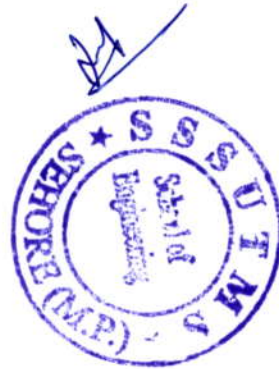



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Reference Books :-

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publications Delhi
3. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4. Geotech. Engg. by C.Venkatramaiah- New AGE International Publishers, Delhi
5. Found. Engg. by GALEonards McGraw Hill Book Co. Inc.
6. Relevant IS Code




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CEC 802 – Advanced Structural Design II (Steel)

Unit – I

Plate girder bridges (Riveted and welded)

Unit – II

Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

Unit – III

Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

Unit - IV

Chimneys: Guyed and self-supporting steel stacks.

Unit – V

Bunkers, Silos & Towers

PRACTICAL & SESSIONAL WORK: Laboratory work will be based on the course of STEEL-II as required for The design of engineering projects.

Reference Books :-

1. Design of Steel Structures – Ramammutham
2. Design of Steel Structures – Punia
3. Steel Str. by Ramchandra Vol II
4. Steel Str. by Arya & Ajmani
5. Design of steel structures – L.S. Negi



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CEC-803(A) Departmental Elective VII

Construction Planning & Management

Unit -I

Preliminary and detailed investigation methods: Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

Unit -II

Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

Unit -III

Tenders & Contracts: Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

Unit -IV

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

Unit-V

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.

Reference Books:-

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai


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CEC-803(B) Departmental Elective VII

Structural Dynamics & Earthquake Engineering

Unit - I.

Single DOF systems - Undamped and Damped, Response to Harmonic and periodic excitations, Response to Arbitrary, Step, Ramp and Pulse Excitations.

Unit - II.

Numerical Evaluation of Dynamic Response - Time stepping methods, methods based on Interpolation of Excitation, Newmark's and Wilson - α method, Analysis of Nonlinear Response, Introduction to frequency domain analysis.

Unit - III.

Elements of seismology - Definitions of the basic terms related to earthquake (magnitude, intensity, epicenter, focus etc.), seismographs Earthquake Response of structures - Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems.

Unit - IV.

Multiple DOF systems: Stiffness and Flexibility matrices for shear buildings, free and forced vibrations-undamped and damped, Modal and Response History Analysis, Systems with distributed mass & elasticity.

Unit - V.

Earthquake Resistant Design of Structures, Design of structures for strength & serviceability, Ductility and energy absorption, Provisions of IS: 1893 and IS: 4326 for aseismic design of structures, Code for ductile detailing IS: 13920.

Reference Books:--

1. Chopra A.K., Dynamics of structures - Theory and Applications to Earthquake Engineering, Prentice Hall of India, New Delhi.
2. Berg G.V. Elements of Structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
3. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
4. Clough R.W. & Penzien J., Dynamics of structures McGraw Hill, New York.


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CEC-804(A) Departmental Elective VIII

Pavement Design

Unit -I.

Equivalent Single Wheels Load concepts and applications, Relationship between wheel arrangements and loading effects, tyre contact area, Effect of load repetition, Effect of transient loads, Impact of moving loading, Factors to be considered in Design of pavements, Design wheel load, soil, climatic factors, pavement component materials, Environmental factors, Special factors such as frost, Freezing and thawing.

Unit -II.

Flexible Pavements : Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

Unit -III.

Rigid Pavements: Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions.

Unit -IV.

Rigid pavement design : IRC method, Fatigue analysis, PCA chart method. AASHTO Method, Reliability analysis.

PAVEMENT JOINTS: Types of joints, contraction and warping joints, dowel bars and tie bars, Temperature reinforcements, filling and sealing of joints.

Unit -V.

Evaluation and Strengthening of Existing Pavements : Benkleman beam method, Serviceability Index Method. Rigid and flexible overlays and their design procedures.

Reference Books:--

1. Principles of pavement design by E.J.Yoder & M.W. Witczak
2. AASHTO, "AASHTO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidelines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent Way"


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CEC-804(B) Departmental Elective VIII

Air Quality Monitoring & Control

Unit - I

Air pollution problem: Economics and social aspects, historical episodes of air pollution. Sources of Air pollution, effects of air pollution on health, animal, plants and materials.

Unit - II

Role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants. general diseases caused by air pollutants. toxicity of various pollutants. Plums patterns and height of chimneys.

Unit - III

Atmospheric chemistry, formation of secondary pollutants – PNN, PBN, Photolytic cycles, general diseases and toxicity of pollutants.

Unit - IV

Sampling and Analyzing of Air Pollutants: Instruments pollution survey, standards of air pollution. Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.

Unit - V

Air pollution control legislation, public education pollution standards, status of air pollution control in various countries. Industrial Hygiene: Concept and importance, factory Involved in environmental hazards, industrial ventilation occupational diseases, control methods.

Reference Books :-

1. "Air Pollution" - Faith W.L, John Wiley & Sons
2. "Air Pollution" - Mc Cabe L.C., Mc. Graw Hill, International
3. Air Pollution - Stern A.C., Academic Press N. York
4. Fundamentals of Air Pollutions - Raju BSN Oxford & IBH Publishing Co. Pvt. Ltd.
5. "Air Pollution" - Rao M.N. & Rao HVN - Tata Mc Graw Hill
6. Air Pollution – Wark and Warner


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CEC-805(A) Open Elective

Advance Water Resources Engineering

Unit - 1

Optimal Rain-gauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis.

Unit - 2

Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.

Unit - 3

System Analysis: Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule.

Unit - 4

Dynamic Programming, its utility in Resource Allocation and other Decision Making Problems, Optimal Operating, Policies, Use of D. P. in Reservoir, Operation.

Unit-5

Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.

Book Recommended:

Test Books

1. Subramany K., Engg. Hydrology.
2. Philipps & Ravindran: Operations Research
3. Hire D.S. & Gupta: Operation Research

Reference Books

1. Loucks D.P., Stedinger I.R. & Haith D.A : Water Resources Systems Engg.
2. Kottegoda N. T., Stochastic Water Resources Technology.
3. Singh V.P. : Elementary Hydrology


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CEC-805(B) Open Elective

Environmental Impact Assessment

UNIT-I

Concept of EIA: Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

UNIT-II

Methods of Impact Identification: Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

UNIT-III

Impact analysis: Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

UNIT-IV

Preparation of written documentation: Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

UNIT-V

Public Participation in Environmental Decision making : Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.

Reference Book :-

1. Environmental Assessment in Practice 1st Edition, Kindle Edition by Owen Harrop , Ashley Nixon
2. The Role of Environmental Monitoring and Audit in the Environmental Impact Assessment Process By Kai-Hang Choi (Author)
3. Environmental Impact Assessment by R.R. Barthwal.
4. Environmental Studies by M. P. Punia.
5. Policy Intervention Analysis: environmental Impact Assessment by Ritu Paliwal, Leena Srivastav


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CE 806 – Industrial Training Project -II

Each candidate should work on project Assigned or Approved by Civil Engineering Department. Student submit report to department.




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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY & MEDICAL SCIENCES

[Established Under Act. 06 of 2014 by Govt. of Madhya Pradesh]

Approved by Madhya Pradesh Private University Regulatory Commission

SH-18, Bhopal-Indore Road, Opposite Oilfed Plant, Pachama, Sehore (M.P.) Pin Code – 466001

Minutes of the Board of Studies Committee Meeting

Bachelor of Engineering

Dated :22.5.2018

The Board of Studies Committee Meeting was held in the room of Dean (SOE) at 2:30 pm on 22.5.2018 following members were present

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member
2. Dr. P. K Agrawal Professor MANIT Bhopal External Member
3. Dr. Sonal Bharti
4. Dr. Ajay Swarup
5. DR. JAYANT MISHRA
6. Mr. HANISH VERMA
7. Mr. NAVEEN PATHAK
8. SHIVAM KUSHWAHA

The Chairman of Borad Of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following agenda points were discussed and revolved

Agenda I approval of (i) SOE – V Semester Scheme and Syllabus as per CBCS.

(ii) VI Semester Scheme and Syllabus CBCS.

Discussion (if any) Syllabus should be prepared as per current demand in industry.

Resolution of the Discussion & Syllabus was prepared as per current demand in industries and was approved for fourth coming V semester CBCS & VI Semester Non-CBCS.

The Chairman Thanks the members for peaceful conduction of meeting.

4. Dr. Ajay Swarup
5. DR. JAYANT MISHRA

Signature of All members (Including Chairman)

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member
2. Dr. P. K Agrawal Professor MANIT Bhopal External Member
3. Dr. Sonal Bharti
4. Dr. Ajay Swarup
5. DR. JAYANT MISHRA
6. Mr. HANISH VERMA
7. Mr. NAVEEN PATHAK
8. SHIVAM KUSHWAHA

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Sri Satya Sai University of Technology & Medical Sciences, Shore (M.P)
Scheme of Examination - CBCS Pattern

Academic Year 2018-2019

Branch : Civil Engineering

Semester - V

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P		
1	CEC-501	Transportation Engineering-II	60	30	10	30	20	2	1	2	4	150
2	CEC-502	Advanced Surveying	60	30	10	30	20	2	1	2	4	150
3	CEC-503	Fluid Mechanics-II	60	30	10	30	20	2	1	2	4	150
4	CEC-504	Department Elective-I	60	30	10			2	1		3	100
5	CEC-505	Department Elective-II	60	30	10			2	1		3	100
6	CEC-506	Open Elective	60	30	10			2	1		3	100
7	CEC-507	Industrial Training - I					100			4	2	100
TOTAL			360	180	60	90	160	12	6	10	23	850
Department Elective I-CEC-504			CEC-504 (A) STRUCTURAL DESIGN & DRAWING-I (RCC)			CEC-504(B) DESIGN OF PRESTRESSED CONCRETE STRUCTURES		CEC-504(C) WATER POWER ENGINEERING				
Department Elective II-CEC-505			CEC-505(A) THEORY OF STRUCTURE-I			CEC-505(B) ENVIRONMENTAL IMPACT ASSESSMENT		CEC-505 (C)AIR QAUALITY MONITORING & CONTROL				
Open Elective -CEC-506			CEC-506(A) Remote Sensing & GIS			CEC-506(B) Theory of Elasticity		CEC-506(C) Water Harvesting and Reuse				



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CEC-501 TRANSPORTATION ENGINEERING-II

UNIT-I High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location. Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

UNIT –II Bituminous & Cement Concrete Payments: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

UNIT – III Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures. Surface and sub-surface drainage, highway materials: properties and testing etc. Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

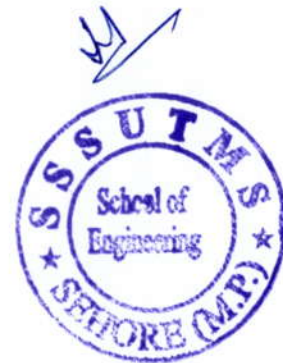
UNIT - IV Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports. Geometrical elements: taxi ways and runways, pattern of runway capacity.

UNIT - V Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.

List of Experiments:

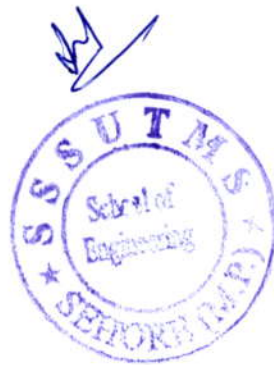
1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate


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Reference Books & Study Materials:

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherty
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Mannual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker




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CEC-502 ADVANCE SURVEYING

UNIT-I Modern equipment's for surveying : Digital levels and theodolites, Electronic Distance measurement(EDM), Total Station and Global Positioning Systems (GPS), Digital Planimeter .

UNIT-II Surveying Astronomy: Definitions of astronomical terms, coordinate systems for locating heavenly bodies, geographic, geodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of latitude and longitude.

UNIT-III GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datum's, GPS receivers, GPS observation methods and their advantages over conventional methods. Digital Terrain Model (DTM) : Topographic representation of the terrain and generation of DTM on computers using spot heights and contour maps.

UNIT-IV Photogrammetry : Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic.

UNIT-V Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Geographic Information Systems (GIS) : Definition, components and advantages. Surveying Project - Student will go for one week Surveying Camp to carry out Project Work.

Surveying Project:- Student will go for one week surveying camp to carry project

SUGGESTED TEXT BOOKS AND REFERENCES :

1. Surveying and Leveling-Part-I & II by T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune
2. Engineering Surveying : Theory and Examination Problems for Students by W. Schofield, Butterworth, Heinemann, Oxford.
3. Surveying: Problems Solving with theory and objective type questions by A.M. Chandra, New Age International Publishers N. Delhi.
4. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
5. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.
6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.



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CEC-503 FLUID MECHANICS-II

UNIT-I Turbulent flow : Laminar and turbulent boundary layers and laminar sublayer, hydrodynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes. Pipe Network : *Water Hammer (only quick closure case). transmission of power. *Hardy Cross Method

UNIT-II Uniform flow in open channels : Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Venet equation.

UNIT-III Non uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume. Unit-IV Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, magnus effect.

UNIT-V Fluid Machines: Turbines : Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitation. Pumps: Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, principle of working and characteristic curves. Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

List of Experiment-

1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Calibration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hyd. Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface Profile over weir
7. Study of the characteristic of the Reciprocating pump

Suggested Books & Study Material:

1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi

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3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Mechanics - K.R. Arora - Standard Publishers Distributors
1705- B, Nai Sarak, Delhi-6
5. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
6. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
7. Engineering Hydraulics By H. Rouse
8. Centrifugal & Axial Flow Pump By Stemanoff A.J. New York
9. Relevant IS codes.




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CEC-504(A) STRUCTURAL DESIGN & DRAWING-I (RCC)

UNIT – I Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

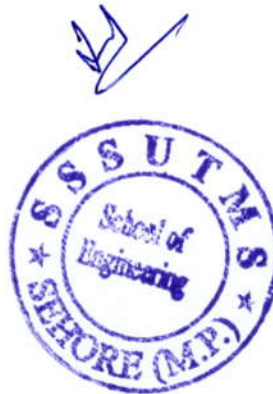
UNIT - II. Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

Unit-III. Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Circular slabs, Waffle slabs, Flat slabs, Yield line theory. Unit -IV. Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

UNIT -V. Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase. NOTE :- All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)

- Suggested Books:** - 1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju


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CEC-504(B) DESIGN OF PRESTRESSED CONCRETE STRUCTURES

Unit – 1.

Introduction, Principles of prestressing, Different methods of prestressing – post tensioning and pre-tensioning.

Prestressed concrete materials. Need for high strength concrete and High concrete tensile steel. Creep and shrinkage of concrete, relaxation of steel. Losses of prestress friction and anchorage of steel.

Unit – 2.

Flexural strength of prestressed concrete section. Analysis of prestress, Resultant stress at a section, Line of Thrust, Load Balancing. Cracking moments.

Shear strength and torsional strength of prestressed concrete section. Principle stresses and principal shear stresses, Ultimate shear resistance.

Unit – 3.

Stress-pattern in anchorage zones. Transmission length. End zone reinforcement. Stress distribution in end block.

Unit – 4.

Design of members for flexure. Code recommendations. Rectangular and I-section. Working out of section dimensions for concrete and prestressing forces for steel.

Application to design of slabs and continuous beams and Bridge girders. Design for camber table and tendon profiles.

Unit – 5.

Design of tension and compression members, Design for combined bending and compressive, Different approaches for design, Introduction to design of transmission poles, roof truss members, purlin, railway sleepers.

Books & References Recommended:

1. Lin T.Y., *Design of Prestressed Concrete Structures*.
2. Varatnam P., *Prestressed Concrete Structures*.
3. Ramarathan S., *Prestressed Concrete*.
4. Graduate I.I., *Prestressed Concrete*.
5. Krishna Raju, *Prestressed Concrete*.
6. Evans R.H. and Bennett R.S., *Prestressed Concrete*.
7. IS-1343.
8. Mullick S.K. and Rangaswamy R.S., *The Mechanics of Prestressed Concrete Design*.




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CEC-504(C) WATER POWER ENGINEERING

UNIT - 1 Optimal Rain gauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis,

UNIT - 2 Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.

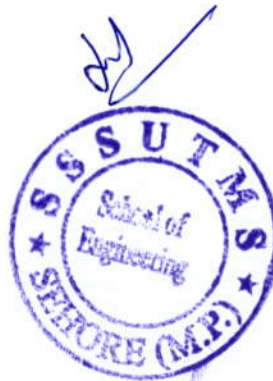
UNIT - 3 System Analysis: Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule

UNIT - 4 Dynamic Programming, its utility in Resource Allocation and other Decision Making Problems, Optimal Operating, Policies, Use of D. P. in Reservoir, Operation.

UNIT-5 Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.

Reference Books

1. Subramany K., Engg. Hydrology.
2. Philipps & Ravindran: Operations Research
3. Hire D.S. & Gupta: Operation Research
4. Loucks D.P., Stedinger I.R. & Haith D.A : Water Resources Systems Engg.
5. Kottegoda N. T., Stochastic Water Resources Technology.
6. Singh V.P. : Elementary Hydrology



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CEC-505(A) THEORY OF STRUCTURE-I

UNIT. I

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

UNIT. II

Indeterminate Structures-I : Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway)

UNIT. III

Indeterminate Structures - II : Analysis of beams and frames by slope Deflection method, Column Analogy method.

UNIT. IV

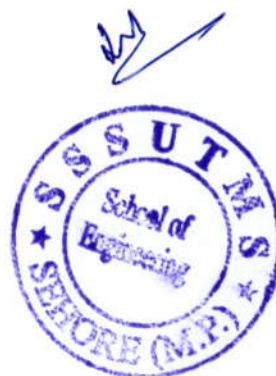
Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.

UNIT. V

Rolling loads and Influence Lines: Maximum SF and BM curves for various types of Rolling loads, focallength, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.

Reference Books:

1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
5. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo




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CEC-505(B) ENVIRONMENTAL IMPACT ASSESSMENT

UNIT-I

Concept of EIA : Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

UNIT-II

Methods of Impact Identification : Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

UNIT-III

Impact analysis : Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

UNIT-IV

Preparation of written documentation : Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

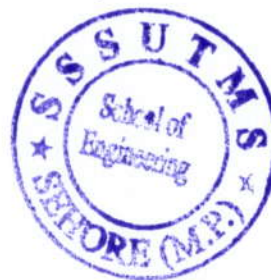
UNIT-V

Public Participation in Environmental Decision making : Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.

References

1. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.
2. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
3. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
4. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi
5. Environmental Engineering - H.S. Peavy & D.R.Rowe-Mc Graw Hill Book Company,New Delhi
6. Water Supply & Sanitary Engg. by S.K. Husain
7. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
8. Relevant IS Codes


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CEC-505(C) AIR QUALITY MONITORING & CONTROL

UNIT - I Air pollution problem: Economics and social aspects, historical episodes of air pollution. Sources of Air pollution, effects of air pollution on health, animal, plants and materials

UNIT - II Role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants. general diseases caused by air pollutants. toxicity of various pollutants. Plums patterns and height of chimneys.

UNIT - III Atmospheric chemistry, formation of secondary pollutants – PNN, PBN, Photolytic cycles, general diseases and toxicity of pollutants

UNIT - IV Sampling and Analyzing of Air Pollutants: Instruments pollution survey, standards of air pollution. Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipment's.

UNIT - V Air pollution control legislation, public education pollution standards, status of air pollution control in various countries. Industrial Hygiene: Concept and importance, factory Involved in environmental hazards, industrial ventilation occupational diseases, control methods.

Reference Books :--

1. "Air Pollution" - Faith W.L, John Wiley & Sons
2. "Air Pollution" - Mc Cabe L.C., Mc. Graw Hill, International
3. Air Pollution - Stern A.C., Academic Press N. York
4. Fundamentals of Air Pollutions - Raju BSN Oxford & IBH Publishing Co. Pvt. Ltd.
5. "Air Pollution" - Rao M.N. & Rao HVN - Tata Mc Graw Hill 6. Air Pollution – Wark and Warner

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CEC-506(A) REMOTE SENSING & GIS

UNIT I-INTRODUCTION AND CONCEPTS- Introduction of Remote Sensing – Energy sources and Radiation principles, Energy equation, EMR and Spectrum, EMR interaction with Atmosphere scattering, Absorption, EMR interaction with earth surface features reflection, absorption, emission and transmission, Spectral response pattern , vegetation, soil, water bodies- Spectral reflectance

UNIT II-AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY- Introduction-,Terrestrial and Aerial photographs - vertical and oblique photographs - height determination contouring - photographic interpretations - stereoscopy – parallax bar- Flight Planning- Photo Interpretation, Applications of aerial Photos-Photo theodolite.

UNIT III-SATELLITE REMOTE SENSING PRINCIPLES Data acquisition –Procedure, Reflectance and Digital numbers- Intensity Reference data , Ground truth, Analog to digital conversion, Detector mechanism- Spectro- radiometer-Ideal remote sensing system – Characters of real and successful remote sensing system- Platforms and sensors- orbits types – Resolution

UNIT IV-REMOTE SENSING SATELLITES Land observation satellites, characters and applications, IRS series, LANDSAT series, SPOT series, High resolution satellites, character and applications, CARTOSAT series, IKONOS Series, QUICKBIRD series, Weather/Meteorological satellites, INSAT series, NOAA, GOES, NIMBUS Applications, Marine observation satellites OCEANSAT

UNIT V-TYPES OF REMOTE SENSING AND IMAGE INTERPRETATION Introduction- Active, Passive, Optical Remote sensing, visible, infrared, thermal, sensors and characters. Microwave remote sensing Sensors, Concept of Microwave remote sensing, SLAR, SAR Scattro-meters,- Altimeter, Characteristics , Image interpretation characters.

Reference books:-

1. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011. ISBN: 81- 7800-112-8
2. A.M.Chandra and S.K. Gosh. Remote Sensing and GIS, Narosa Publishing Home, New Delhi 2009.
3. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman Remote sensing and image interpretation John Wiley & Sons, 2008
4. George Joseph , Fundamentals of Remote Sensing Universities Press, Hyderabad 2005


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CEC-506(B) THEORY OF ELASTICITY

UNIT-I Analysis of Stress: Definition and notation of stress, equations of equilibrium in differential form, stress components on an arbitrary plane, equality of cross shear, stress invariants, principal stresses, octahedral stress, planes of maximum shear, stress transformation, plane state of stress, Numerical problems

UNIT-II Analysis of Stress: Definition and notation of stress, equations of equilibrium in differential form, stress components on an arbitrary plane, equality of cross shear, stress invariants, principal stresses, octahedral stress, planes of maximum shear, stress transformation, plane state of stress, Numerical problems

UNIT-III Two-Dimensional classical elasticity Problems: Cartesian co-ordinates - Relation between plane stress and plane strain, stress functions for plane stress and plane strain state, Airy's stress functions, Investigation of Airy's stress function for simple beams, bending of a narrow cantilever beam of rectangular cross section under edge load. Bending of simply supported beam under UDL. General equations in polar coordinates, stress distribution symmetrical about an axis, Thick wall cylinder subjected to internal and external pressures, Numerical Problems.

UNIT-IV Axisymmetric and Torsion problems: Stresses in rotating discs of uniform thickness and cylinders. Torsion of circular, elliptical and triangular bars, Prandtl's membrane analogy, torsion of thin walled thin tubes, torsion of thin walled multiple cell closed sections. Numerical Problems

UNIT-V Thermal stress and Elastic stability: Thermo elastic stress strain relations, equations of equilibrium, thermal stresses in thin circular discs and in long circular cylinders. Euler's column buckling load: clamped-free, clamped-hinged, clamped-clamped and pin-ended, Numerical Problems.

Reference books :-

1. Theory of Elasticity Timoshenko and Goodier, McGraw Hill Book Company
2. Applied Elasticity Wang, S. N, Publisher
3. Mechanics of deformable solids Irving Shames, Krieger Pub Co


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CEC-506(C) WATER HARVESTING AND REUSE

UNIT-I Concept and characteristics of watershed, planning and management of watershed, need for artificial recharge and rainwater harvesting,

UNIT-II Selection of artificial recharge zones, estimation of probable runoff from an area including from roof tops,

UNIT-III artificial recharge structures: ponds, pits, wells, bore wells.

UNIT-IV Rainwater harvesting in urban areas: Roof top rain water harvesting structures – design – construction maintenance and monitoring of RWH structures.

UNIT-V Effect on local groundwater environments -, Recycling of domestic water – sources of water for recharge in urban areas.

Reference Books:-

1. Ground Water H.M.Raghunath, New Age International
2. Rainwater Harvesting Kollegal & Maghshyam, J.M. Jaina & Brothers




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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P)
Scheme of Examination - CBCS Pattern

Academic Year 2018 - 2019

Branch : Civil Engineering

Semester - VI

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Periods/ hour/ week			Credits	Total Marks	
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L	T	P			
1	CEC- 601	Theory of Structures-II	60	30	10	30	20	2	1	2	4	150	
2	CEC- 602	Geotechnical Engineering	60	30	10	30	20	2	1	2	4	150	
3	CEC- 603	Environmental Engg-I	60	30	10	30	20	2	1	2	4	150	
4	CEC- 604	Department Elective-III	60	30	10			2	1		3	100	
5	CEC- 605	Department Elective-IV	60	30	10			2	1		3	100	
6	CEC- 606	Open Elective	60	30	10			2	1		3	100	
7	CEC- 607	Industrial Training Project - I				100					4	2	100
TOTAL			360	180	60	190	60	12	6	10	23	850	
Department Elective III-CEC- 604			CEC-604(A) Water resources & Irrigation Engineering			CEC-604(B) Ground Water Hydrology		CEC-604(C) Geotechnical Investigations for Civil Engineering Structures					
Department Elective IV-CEC-605			CEC 605(A) Structural Design & Drawing - I (STEEL)			CEC-605(B) Highway Geometric Design		CEC-605(C) New Technologies for Transportation Engineering					
Open Elective -CEC-606			CEC-606(A) Industrial waste treatment			CEC-606(B) IPR (INTELLECTUAL PROPERTY RIGHTS)		CEC-606(C) Renewable Energy Systems					

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CEC-601 THEORY OF STRUCTURE-II

Unit- I

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit- II

Plastic analysis of beams and frames.

Unit-III

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit-IV

Matrix method of structural analysis: force method and displacement method.

Unit -V

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Reference Books :-

1. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
2. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi

List of Experiments:-

- 1) Experiment on a 2 hinged arch for horizontal thrust and influence line for horizontal thrust.
- 2) Experimental and analytical study of a 3 bar pin jointed truss.
- 3) Experimental and analytical study of deflection and unsymmetrical bending of a cantilever beam.
- 4) Begg defometer- verification of Muller Breslau principle.
- 5) Experimental and analytical study of an elastically coupled beam.
- 6) Sway in portal frames- demonstration.
- 7) To study the cable geometry and statics for different loading condition.
- 8) To plot stress-strain curve for concrete. Use of mechanical and electrical strain and stress gauge.


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CEC-(602) GEOTECHNICAL ENGINEERING

UNIT - I Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on Engineering behavior. Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

UNIT - II Soil Water and Consolidation: Soil water, Permeability Determination of permeability in Laboratory and in field. Seepage and seepage pressure. Flow nets, uses of a flow net, Effective, neutral and total stresses. Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of reconsolidation pressure, settlement analysis. Calculation of total settlement.

UNIT - III Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. New mark's influence chart. Contact pressure distribution. Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Tri axial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

UNIT - IV Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

UNIT - V Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cohesion-less and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils. Reinforced earth retaining walls.

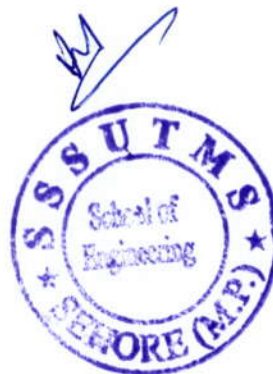
Suggested Books: -

1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Modern Geotech Engg. by Dr. I Aram Singh - IBT Publishers, Delhi.
4. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi
5. Soil Mech. & Found. Engg. by S.K. Garg- Khanna Publishers, Delhi.
6. Soil Testing for Engg. by T.W. Lambe - John Wiley & Soms. Inc.
7. Relevant I.S. Codes

List of Experiments:

1. Determination of Hygroscopic water content
2. Particle - size analysis
3. Determination of Specific gravity of soil particles
4. Determination of plastic limit
5. Determination of liquid limit
6. Determination of shrinkage limit
7. Permeability tests
8. Direct shear test

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CEC-(603) ENVIRONMENTAL ENGG.-I

UNIT - I Estimation of ground and surface water resources. quality of water from different sources, Demand & quantity of water, fire demand, water requirement for various uses, fluctuations in Demand, forecast of population.

UNIT - II Impurities of water and their significance, water-borne diseases, physical, chemical and Bacteriological analysis of water, water standards for different uses. Intake structure, Conveyance of water, pipe materials, pumps - operation & pumping stations.

UNIT - III Water Treatment methods-theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

UNIT - IV Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

UNIT - V Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

Suggested Books and Reading Materials:-

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
3. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi
4. Environmental Engineering - H.S. Peavy & D.R.Rowe-Mc Graw Hill Book Company, New Delhi
5. Water Supply & Sanitary Engg. by S.K. Husain
6. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
7. Relevant IS Codes

List of Experiments:

1. To study the various standards for water.
2. To study of sampling techniques for water.
3. Measurement of turbidity.
4. To determine the coagulant dose required to treat the given turbid water sample.
5. To determine the conc. of chlorides in a given water samples.
6. Determination of hardness of the given sample.
7. Determination of residual chlorine by "Chloroscope."
8. Determination of Alkalinity in a water samples.
9. Determination of Acidity in a water samples.


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10. Determination of Dissolved Oxygen (DO) in the water sample.

CEC-604(A) WATER RESOURCES AND IRRIGATION ENGINEERING

UNIT - I Irrigation water requirement and Soil-Water-Crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

UNIT - II Ground Water and Well irrigation: Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow Conditions, infiltration galleries. Ground water recharge-necessity and methods of improving Ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence causes and effects. reclamation of water logged and salt affected lands. Types of wells, well Construction, yield tests, specific capacity and specific yield, advantages and disadvantages of well irrigation.

UNIT- III HYDROLOGY : Hydrological cycle, precipitation and its measurement, recording and non-recording rain gauges, estimating missing rainfall data, rain gauge networks, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

UNIT - IV Canals and Structures: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lining-objectives, materials used, economics. Introductions to Hydraulic Structures viz. Dams, Spillways, Weirs, , Barrages, Canal Regulation Structures.

UNIT- V Floods: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control,

Suggested Books:-

1. Irrigation & Water Power Engg. by Punmia & Pandey B.B.Lal
2. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
3. Engg. Hydrology - J.NEMEC - Prentice Hall
4. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
5. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
6. Engg. Hydrology by H.M. Raghunath

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CEC-604(B) GROUND WATER HYDROLOGY

UNIT-I INTRODUCTION: Ground water utilization & historical background, ground water in hydrologic cycle, ground water budget, ground water level fluctuations & environmental influence, literature/ data/ internet resources.

UNIT-II OCCURRENCE AND MOVEMENT OF GROUND WATER: Origin & age of ground water, rock properties affecting groundwater, groundwater column, zones of aeration & saturation, aquifers and their characteristics/classification, groundwater basins & springs, Darcy's Law, permeability & its determination, Dupuit assumptions, heterogeneity & anisotropy, Ground water flow rates & flow directions, general flow equations through porous media.

UNIT-III POLLUTION AND QUALITY ANALYSIS OF GROUND WATER: Municipal ,industrial ,agricultural ,miscellaneous sources & causes of pollution, attenuation, underground distribution, potential evaluation of pollution, physical ,chemical ,biological analysis of ground water quality, criteria & measures of ground water quality, ground water salinity & samples, graphical representations of ground water quality.

UNIT-IV SURFACE & SUB-SURFACE INVESTIGATION OF GROUND WATER: Geological ,geophysical exploration, remote sensing , electric resistivity ,seismic refraction based methods for surface investigation of ground water, test drilling & ground water level measurement, sub-surface ground water investigation through geophysical , resistivity ,spontaneous potential ,radiation , temperature ,caliper , fluid conductivity , fluid velocity ,miscellaneous logging.

UNIT-V ARTIFICIAL GROUND WATER RECHARGE: Concept & methods of artificial ground water recharge, recharge mounds & induced recharge, wastewater recharge for reuse, water spreading.

Reference books: -

1. D.K. Todd and L. F. Mays, "Groundwater Hydrology", John Wiley and sons.
2. K. R. Karanth, "Hydrogeology", TataMcGraw Hill Publishing Company.
3. S. Ramakrishnan, "Ground water", S. Ramakrishnan.



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CEC-604(C) GEOTECHNICAL INVESTIGATIONS FOR CIVIL ENGINEERING STRUCTURES

UNIT-I

Need and importance of site investigations, site exploration and phasing of site exploration programme, Spacing and depth of bore holes, significant depth.

UNIT-II

Methods of site exploration soundings, bore holes, drilling methods and equipment wash boring, rotary boring and percussion boring in soils.

UNIT-III

Stabilization of bore holes, Procuring and handling of disturbed and undisturbed samples, various types of samplers and sampling techniques, their relative merits and suitability in particular cases, lowering of water table.

UNIT-IV

Geophysical methods of soil exploration. Observation of ground water level and pressure Soil testing techniques used in Laboratory, field tests for permeability, in place density, vane test, plate bearing test, standard penetration test.

UNIT-V

Discussion and seminar on published papers of recent origin connected with exploration and testing of soils, case histories of failure of structures.

Reference books:-

1. Basic and Applied Soil Mechanics- A.S. Rao and Gopal Ranjan, New Age International.
2. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
3. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
4. Modern Geotech Engg. by Dr. I Aram Singh - IBT Publishers, Delhi.


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CEC 605(A) STRUCTURAL DESIGN & DRAWING – I (STEEL)

UNIT - I

Various loads and mechanism of the load transfer, partial load factors, structural properties of Steel, Design of structural connections - Bolted, Riveted and Welded connections.

UNIT - II

Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.

UNIT- III

Design of simple beams, Built-up beams, Plate girders and gantry girders.

UNIT – IV

Effective length of columns, Design of columns-simple and compound, Lacings & battens. Design of footings for steel structures, Grillage foundation.

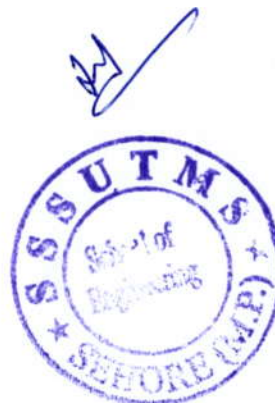
UNIT – V

Design of Industrial building frames, multistory frames, Bracings for high rise structures, Design of transmission towers. NOTE: - All the designs for strength and serviceability should strictly be as per the latest version Of IS:800.

Reference Books :-

- i) Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
- ii) Design of steel structures by P. Dayaratnam
- iii) Design of steel structures Vol. I & II by Ramchandra
- iv) Design of steel structures by L.S. Negi
- v) Design of steel structures by Ramammutham
- vi) Design of steel structures by Punmia


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CEC-605(B) HIGHWAY GEOMETRIC DESIGN

UNIT-I INTRODUCTION

Geometric Control factors like Topography – design speed – design vehicle – Traffic – Capacity – volume – environment and other factors as per IRC and AASHTO standards and specifications- PCU concept – factors controlling PCU for different design purpose

UNIT-II CROSS SECTIONAL ELEMENTS

Pavement surface characteristics –friction – skid resistance – pavement unevenness- light reflecting characteristics – camber – objectives – types of camber – methods of providing cambers in the field – problems – carriage way – kerb – median –shoulder – foot path – parking lanes – service roads – cycle tracks –Driveways – Right of way – Factors influencing right of way – Design of Road humps as per latest IRC provisions

UNIT-III SIGHT DISTANCE Important, types, Side distance at uncontrolled intersection, derivation, factors affecting side distance, IRC, AASHTO standards, problems on above.

UNIT-IV HORIZONTAL ALIGNMENT Definition, Checking the stability of vehicle, while moving on horizontal curve, Super elevation, Ruling minimum and maximum radius, Assumptions – problems – method of providing super elevation for different curves – Extra widening of pavement on curves – objectives – Mechanical widening – psychological widening – Transition curve – objectives – Ideal requirements – Types of transition curve – Method of evaluating length of transition curve – Setting the transition curve in the field, set back distance on horizontal curve and problems on above

UNIT-V VERTICAL ALIGNMENT Gradient – Types of gradient – Design criteria of summit and valley curve – Design of vertical curves based on SSD – OSD– Night visibility considerations – Design standards for hilly roads –problems on the above. Principle – At grade and Grade separated junctions – Types – channelization – Features of channelizing Island –median opening – Gap in median at junction.

Reference Books:-

1. Khanna, S.K. & Justo, C.E.G., Highway Engineering, NemChand & Bros, Roorkee (U.A).
2. Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi.
3. Kadiyali, L.R. & Lal, N.B., Principles & Practices of Highway Engineering, Khanna Publishers, New Delhi.
4. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand & Co., New Delhi.
5. IRC – 37 "Guidelines for Design of flexible Pavements", IRC, New Delhi, 2001.
6. IRC – 67 "Code of Practice for Road Signs", IRC, New Delhi – 2001. 30
7. IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December, 2002.
8. IRC:70, 1977: "Guidelines on Regulation and Control of Mixed Traffic in Urban Areas"


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9. IRC:106, 1990: "Guidelines for Capacity of Urban Roads in Plain Areas"

CEC-605(C) NEW TECHNOLOGIES FOR TRANSPORTATION ENGINEERING

UNIT-I ANALYSIS AND DESIGN OF PAVEMENT STRUCTURES Introduction , Importance and Functions of Various Components of Pavement Structures, Analysis of Stresses in Flexible and Rigid Pavements, Methods for Design of Flexible and Rigid Pavements, Design and Construction of Joints.

UNIT-II TRAFFIC ENGINEERING AND MANAGEMENT Introduction, Traffic Characteristics, Traffic Studies, Urban Travel Characteristics, Design, Operation and Control of Traffic Facilities, Techniques for Traffic Management. Road Safety. Advance topic like Road Safety, traffic forecasting etc.

UNIT-III TRANSPORT PLANNING Hierarchical Levels of Planning, General Concept and Process, Travel Demand Estimation and Forecasting, Regional Transport Planning, Trip Generation Methods, Modal Split Analysis, Behavioral Approach, Two Stage Model Split Models. Trip Distribution, Growth Factor Method, Gravity Models, Intervening Opportunity and Competing Opportunity Models, Land Use Transport Planning Models, Network Assignment.

UNIT-IV HIGHWAY CONSTRUCTION AND MAINTENANCE Sub-grade analysis and design, type of highway construction: WBM, WMM, DLC, type of bituminous construction: construction techniques and quality control, type of cement concrete construction, joints etc. highway maintenance.

UNIT-V PUBLIC TRANSPORT SYSTEM Mass Transportation Characteristics, Urban Public Transportation Planning, Terminals and their Functions, Basic Concepts for Analysis and Design of Public Transport Routes, Economic Evaluation Methods.

Reference books:-

1. Traffic Engineering and Transport Planning- L.R. Kadiyali, Khanna Publisher
2. Principles of Transportation Engineering, Chakroborti and Das, PHI Learning Pvt. Ltd
3. Highway Engineering- S.K.Khanna& C.E.G. Justo, Nem Chand and Bro.
4. Public Transportation Planning, Operation ,& Management- Gray, GE Hoel, L.A, Prentice Hall.
5. Principles & Practice of Highway Engg.- L.R. Kadiyali, Khanna Publishers


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CEC-606(A) INDUSTRIAL WASTE TREATMENT

UNIT I : INTRODUCTION

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II : CLEANER PRODUCTION

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III : POLLUTION FROM MAJOR INDUSTRIES

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV : TREATMENT TECHNOLOGIES

Equalization – Neutralization – Removal of suspended and dissolved organic solids – Chemical oxidation – Adsorption – Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal

UNIT V : HAZARDOUS WASTE MANAGEMENT

Hazardous wastes – Physico chemical treatment – solidification – incineration – Secure land fills

REFERENCES:

- Rao M. N. & Dutta A. K. , "Wastewater Treatment", Oxford – IBH Publication, 1995.
- Eckenfelder W.W. Jr., "Industrial Water Pollution Control", McGraw Hill Book Company, New Delhi, 2000.
- Patwardhan. A.D., "Industrial Wastewater Treatment", Prentice Hall of India, New Delhi 2010.


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CEC-606(B) IPR (INTELLECTUAL PROPERTY RIGHTS)

UNIT I Introduction;

Introduction and Justifications of IPR, Nature of IP, Major forms of IP- Copyright, Patent, Trade Marks Designs, Geographic indication, layout design of Semi conductors, Plant varieties, Concept & Meaning of Intellectual Property. Major international documents relating to the protection of IP - Berne Convention, Paris Convention, TRIPS.

UNIT II Copyright;

Meaning and historical development of copyright , Subject matter , Ownership of copyright, Term of copyright, Rights of owner, Economic Rights, Moral Rights. Assignment and licence of rights, Infringement of copyright, Exceptions of infringement, Remedies, Civil, Criminal, Administrative, Registration Procedure.

UNIT III Patents;

Meaning and historical development,. Criteria for obtaining patents, Non patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory licence, Revocation, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board.

UNIT IV – Trade Marks, Designs & GI Trade Marks:

Functions of marks, Procedure for registration, Rights of holder, Assignment and licensing of marks, Infringement, Trade Marks Registry and Appellate Board. Designs: Meaning and evolution of design protection, Registration, Term of protection, Rights of holder, unregistered designs. Geographical Indication: Meaning and evolution of GI, Difference between GI and Trade Marks, Registration, Rights, Authorized user.

UNIT V Contemporary Issues & Enforcement of IPR;

IPR & sustainable development, The Impact of Internet on IPR. IPR Issues in biotechnology, E-Commerce and IPR issues, Licensing and enforcing IPR, Case studies in IPR

References:

1. P. Narayanan, Intellectual Property Law, Eastern Law House
2. . Neeraj Pandey and Khushdeep [Dharni, Intellectual Property Rights, PHI, 2014
3. N.S Gopalakrishnan and T.G. Agitha, Principles of Intellectual Property, Eastern Book Co. Lucknow, 2009.
4. Anand Padmanabhan, Enforcement of Intellectual Property, Lexis Nexis Butterworths, Nagpur, 2012.
5. Managing Intellectual Property The Strategic Imperative, Vinod V. Sople, PHI.
6. Prabuddha Ganguli, " Intellectual Property Rights" Mcgraw Hill Education 2016.

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CEC-606(C) RENEWABLE ENERGY SYSTEMS

UNIT-I Solar Radiation: Extra-terrestrial and terrestrial, radiation measuring instrument, radiation measurement and predictions. Solar thermal conversion: Basics, Flat plate collectors-liquid and air type. Theory of flat plate collectors, selective coating, advanced collectors, Concentrators: optical design of concentrators, solar water heater, solar dryers, solar stills, solar cooling and refrigeration.

UNIT-II Solar photovoltaic: Principle of photovoltaic conversion of solar energy; Technology for fabrication of photovoltaic devices; Applications of solar cells in PV generation systems; Organic PV cells.

UNIT-III Wind energy characteristics and measurement: Metrology of wind speed distribution, wind speed statistics, Weibull, Rayleigh and Normal distribution, Measurement of wind data, Energy estimation of wind regimes. power curve of wind turbine, capacity factor, matching wind turbine with wind regimes; Application of wind energy.

UNIT-IV Production of biomass, Classification of biomass; Physicochemical characteristics of biomass as fuel Biomass conversion routes: biochemical, chemical and thermo chemical Biochemical conversion of biomass to energy: anaerobic digestion, biogas production mechanism, technology, types of digesters, design of biogas plants, installation, operation and maintenance of biogas plants, biogas plant manure-utilization and manure values. Biomass Gasification: Different types, power generation from gasification, cost benefit analysis of power generation by gasification.

UNIT-V Small Hydropower Systems: Overview of micro, mini and small hydro system; hydrology; Elements of turbine; Assessment of hydro power; selection and design criteria of turbines; site selection and civil works; speed and voltage regulation; Investment issue load management and tariff collection; Distribution and marketing issues..

References:

1. Kothari, Singal & Rajan; Renewable Energy Sources and Emerging Technologies, PHI Learn
2. Khan, B H, NonConventional Energy, TMH.
3. Sukhatme and Nayak, Solar Energy, Principles of Thermal Collection and Storage, TMH.
4. Tiwari and Ghosal, Renewable Energy Resources: basic principle & application


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(Established under Govt. of M.P. Registered under UGC 2(F) 1956)

Bhopal-Indore Road, Opp. Pachama oilfield plant, Pachama, Dist.-Sehore M.P. PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@sssutms.co.in

Name of Faculty : School of Engineering

Name of Department : **Civil Engineering**

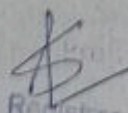
Minutes of Board of Studies Committee Meeting Dated on **03.06.2019**

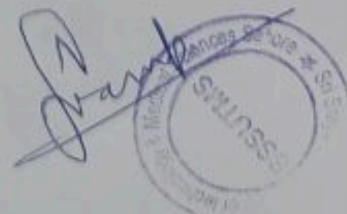
The Board of Studies Committee Meeting was held in the room of Department of **Civil Engineering** at 2:30 PM. on **03.06.2019**, Following members were present.

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member
2. Dr. P . K Agrawal Professor MANIT Bhopal External Member
3. Dr. Ajay Swarup Assoc. Prof. (Civil Engineering), - Chairman
4. Dr. Arun Patel Assoc. Prof. (Civil Engineering, RKDF Bhopal),-External Member
5. Dr. Jayant Mishra, Prof. (Civil Engineering), Member
6. Dr. G M Kapse Prof. (Civil Engineering), Member
7. Ms. Kamni Laheriya, Asstt. Prof. (Civil Engineering), Member
8. Mr. Baldev Barde, Asstt. Prof. (Civil Engineering), Member
9. Mr. Babar Hussain, Asstt. Prof. (Civil Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda Preparation of syllabus and Scheme for I to IV Sem.


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Discussion Scheme

Scheme and syllabus was put up before the member as per recent AICTE guidelines, It was discussed in detail by the members and some modification were suggested.

Resolution of the Discussion:

It was resolved that scheme and syllabus as proposed with some modification and may be accepted

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr. Saleem Akhter Professor RGPV Bhopal External Member



2. Dr. P . K Agrawal Professor MANIT Bhopal External Member



3. Dr. Ajay Swarup Assoc. Prof. (Civil Engineering), - Chairman



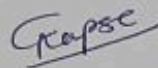
4. Dr. Arun Patel Assoc. Prof. (Civil Engineering, RKDF Bhopal), - External Member



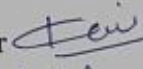
5. Dr. Jayant Mishra, Prof. (Civil Engineering), Member



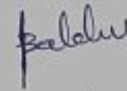
6. Dr. G M Kapse Prof. (Civil Engineering), Member



7. Ms. Kamni Laheriya, Asstt. Prof. (Civil Engineering), Member



8. Mr. Baldev Barde, Asstt. Prof. (Civil Engineering), Member



9. Mr. Babar Hussain, Asstt. Prof. (Civil Engineering), Member



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Chairman

Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)
Scheme of Examination

Bachelor of Engineering (CS, CE, ME, AE, MI, EI)
I Semester / I Year

Academic Year 2019-20

GROUP - B

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)			Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L		T	P		
1	BEBSC-101	Mathematics-I	60	30	10	-	-	100	3	-	-	3	
2	BEBSC- 202	Engineering Physics	60	30	10	30	20	150	2	1	2	4	
3	BEESC-203	Basic Computer Engineering	60	30	10	30	20	150	3	-	2	4	
4	BEESC-204	Basic Mechanical Engineering	60	30	10	30	20	150	2	-	2	3	
5	BEESC-205	Basic Civil Engineering & Mechanics	60	30	10	30	20	150	3	-	2	4	
6	BEHSMC-206	Language Lab	-	-	-	30	10	40	-	-	2	1	
7	BELC-107	Self Study / GD Seminar	-	-	-	-	10	10	-	-	2	1	
		Total	300	150	50	150	100	750	13	1	12	20	

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Course Content

I SEMESTER

BEBSC-101 Mathematics-I

BEBSC-101	Mathematics-I	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

The Preamble of this foundational course is to review mathematical concepts already learnt in higher secondary. This course will also introduce fundamentals of mathematical functions, derivatives and aspects of calculus to students. This course deep understanding of matrix, differential equations, Sequences and series, Vector Space as well as a strong sense of how useful the subject can be in other disciplines of learning.

Unit-I Calculus

10 Hr

Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two variables), Method of Lagrange's Multipliers.

Unit-II Integral

6 Hr

Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas, Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of the curves.

Unit-III Sequences and series

6 Hr

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-IV Vector Spaces

6 Hr

Vector Space, Vector Sub Space, Linear Combination of Vectors, Linearly Dependent, Linearly Independent, Basis of a Vector Space, Linear Transformations.

Unit-V Matrices

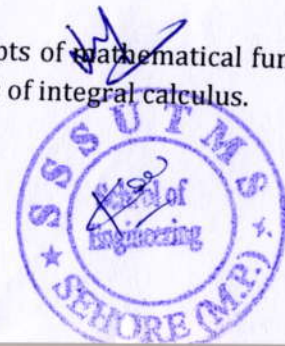
10 Hr

Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

Outcome:-

Course work is designed to provide students the opportunity to learn key concepts of mathematical functions, key concepts of matrix, Vector Spaces as well as fundamentals and applications of integral calculus.

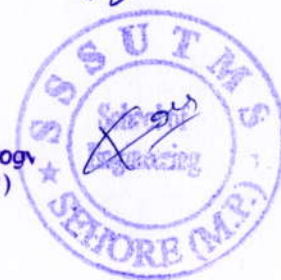
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References:-

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.


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BEBSC-102

Engineering Chemistry

BEBSC-102	Engineering Chemistry	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

1. To acquire knowledge about hardness of water and importance of water in industrial purpose.
2. To understand the concept of molecular spectroscopy.
3. To gain the knowledge of about polymeric material and biodegradable substances.
4. To understand the mechanism of lubricant and properties of lubricant.

Outcomes:

1. Develop innovative methods to produce soft water for industrial use.
2. Identify the structure of unknown / new compounds with the help of spectroscopy.
3. Substitute metal with conducting polymers and produce cheaper biodegradable polymers to reduce environmental pollution.
4. Apply their knowledge for use and protect to industrial and domestic equipment.

UNIT-I Atomic and molecular structure

6Hr

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. water treatment- Introduction, hardness of water, Units of hardness, disadvantage of hard water, scale and sludge formation in boilers, boilers troubles.

UNIT-II Spectroscopic techniques and applications

10Hr

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

UNIT-III Intermolecular forces and potential energy surfaces

6Hr

Ionic, dipolar and van Der Waals interactions. Lubricant-Introduction, mechanism of lubricant, classification of lubricant, properties of lubricating oils.

UNIT-IV Use of free energy in chemical equilibria

10Hr


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Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. High Polymers-Introduction, nomenclature, types of polymerization, classification of polymers, plastics-important, thermo-plastic resins and thermo setting resin,

UNIT-V Periodic properties

10Hr

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

REFERENCES:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
3. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.
4. Physical Chemistry, by P. W. Atkins
5. engg. Chemistry jain.jain
6. engg. Chemistry shashi chawla.

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BEBSC-102

Engineering Chemistry

BEBSC-102	Engineering Chemistry	0L:0T:2P	1 credits	2Hrs/Week
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LIST OF EXPERIMENTS:

1. Determination of surface tension and viscosity
2. Determination of chloride content of water
3. Determine the change of viscosity of given lubricating oil with change in temperature by Redwood Viscometer No. 1.
4. Determine the change of viscosity of given lubricating oil with change in temperature by Redwood Viscometer No. 2.
5. To determine the flash and fire point of given lubricating oil by Cleveland's open cup apparatus.
6. To determine the flash and fire point of given lubricating oil by Abel's closed cup apparatus.
7. To determine the flash and fire point of given lubricating oil by Pensky Marten's apparatus.
8. To determine the total hardness of given water sample by titrating it against EDTA solution using EBT as an indicator.

Laboratory Outcomes:

The students will learn to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample


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BEHSMC-103

English for Communication

BEHSMC-103	English for Communication	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

1. To enhance Professional competence in reading, writing, listening and speaking.
2. To modify the tactic of providing information about the language by using several techniques.
3. To minimize the Grammar Translation Method of ELT by replacing it with Direct Learning Method.
4. To Introduce Communicative Method of ELT and focusing the teaching pedagogy to the student-centered learning rather than the teacher-centered learning.
5. To develop the skills to master three major forms of communications which are vital in academic and professional settings namely professional presentations, interviews and group communications respectively.
6. To provide a deep insight of techniques for delivering effective presentations, appealing job interviews, and actively participating in various forms of group communication.

UNIT-I Identifying Common errors in writing

6 Hr

Articles, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure.

UNIT-II Vocabulary building and Comprehension

6 Hr

Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, synonyms, antonyms, Reading comprehension.

UNIT-III Communication:

10 Hr

Introduction, Meaning and Significance, Process of Communication, Oral and Written Communication, 7 c's of Communication, Barriers to Communication and Ways to overcome them, Importance of Communication for Technical students, nonverbal communication.

UNIT-IV Developing Writing Skills

10 Hr

Planning, Drafting and Editing, Precise Writing, Précis, Technical definition and Technical description. Report Writing: Features of writing a good Report, Structure of a Formal Report, Report of Trouble, Laboratory Report, Progress Report.

UNIT-V Business Correspondence

10 Hr

Importance of Business Letters, Parts and Layout; Application, Contents of good Resume, guidelines for writing Resume, Calling/ Sending Quotation, Order, Complaint, E-mail and Tender.

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Outcome:-

At the end of this course students will have:

- C01:** Ability to design a language component or process to meet desired need within Realistic, Constraints such as economic, environmental, social, political, ethical Scenario.
- C02:** Ability to analyze the usage of English words in different contexts.
- C03:** An understanding of technical and academic articles' comprehension.
- C04:** The ability to present oneself at multinational levels knowing the type of different Standards of English

References:-

1. 'Technical Communication : Principles and practice', Meenakshi Raman and Sangeeta Sharma (Oxford)
2. 'Effective Business Communication', Krizan and merrier (Cengage learning)
3. 'Communication Skill, Sanjay Kumar and pushlata, OUP2011
4. "Practical English Usage Michael Swan OUP, 1995.
5. "Exercises in spoken English Parts I-III CIEFL, Hyderabad, Oxford University Press
6. On writing well, William Zinsser, Harper Resource Book 2001.
7. Remedial English Grammar, F.T. Wood, Macmillan 2007.


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BEHSMC-103

English for Communication

BEHSMC-103	English for Communication	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiments:-

1. Listening Comprehension.
2. Pronunciation, Intonation, Rhythm
3. Practicing everyday dialogues in English
4. Interviews.
5. Formal Presentation.


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BEESC-104

Basic Electrical & Electronics Engineering

BEESC-104	Basic Electrical Engineering	2L:0T:0P	2 credits	2Hrs/Week
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Preamble:-

Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context and to provide students the working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.

Unit-I Electrical circuit elements

10 Hr

Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff's laws, Loop and-delta transformation, nodal methods, Superposition of a theorem, Thevenin theorem, Norton theorem.

Unit-II AC Circuits

10 Hr

Representation of Sinusoidal waveforms –Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of single phase AC Circuits consisting of R, L, C, RL, RC, RLC combinations (Series and Parallel), Apparent, active & reactive power, Power factor, power factor improvement. Concept of Resonance in series & parallel circuits, bandwidth and quality factor. Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit-III Magnetic circuit

6 Hr

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

Unit-IV Machines

10 Hr

DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)

Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only)

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

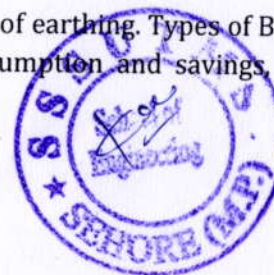
Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.

Unit-V Components of LT Switchgear:

6 Hr

Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing. Types of Batteries, Important characteristics for Batteries. Elementary calculations for energy consumption and savings, battery backup.

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Outcome:-

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations

Reference's: -

1. Ritu Sahdev, "Basic Electrical Engineering",
2. S. Singh, P.V. Prasad, "Electrical Engineeri
3. D. P. Kothari and Electrical.I.Nagrath,Engineering", "Basic Tat
4. D. C. Kulshreshtha, "Basic Electrical Engine
5. E. Hughes, "Electrical and Electronics Techn
6. 6.S. Bobrow, "Fundamentals of Electrical En
7. 7.V. D. Toro, "Electrical Engineering Fundamen


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BEESC-104
Basic Electrical Engineering

BEESC-104	Basic Electrical Engineering	0L:0T:2P	1 credits	2Hrs/Week
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Laboratory Preambles:

1. Read and demonstrate the rating of basic equipments used in electrical engineering
2. Connections of different components as per the rules
3. Application different components in electrical field

List of Experiments: -

1. Verification of Kirchoff's laws
2. Verification of Superposition and Thevenin Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Connection and measurement of power consumption of a fluorescent lamp (tube light).
6. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
7. Determination of parameters of ac single phase series RLC circuit
8. To observe the B-H loop of a ferromagnetic material in CRO.
9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
10. Determination of efficiency of a dc shunt motor by load test
11. To study running and speed reversal of a three phase induction motor and record speed in both directions.
12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single-phase induction machine and synchronous machine.

Laboratory Outcomes

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical machines.


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BEESC-105
Engineering Graphics

BEESC-105	Engineering Graphics	2L:1T:0P	3 credits	3Hrs/Week
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Preambles:-

1. Increase ability to communicate with people.
2. Learn to sketch and take field dimensions.
3. Learn to take data and transform it into graphic drawings.
4. Learn basic Auto Cad skills.
5. Learn basic engineering drawing formats.
6. Prepare the student for future Engineering positions.

UNIT-I Introduction to Engineering Drawing

10 Hr

Principles of Engineering Graphics and their significance, usage of Drawing instruments, Lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales -Plain, Diagonal and Venire Scales;

UNIT-II Orthographic Projections

10 Hr

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Projections of Regular Solids those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale

UNIT-III Sections and Sectional Views of Right Angular Solids

6 Hr

Prism, Cylinder, Pyramid, Cone -Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only).

UNIT-IV Isometric Projections:

6 Hr

Principles of Isometric projection -Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT-V Overview of Computer Graphics:

10 Hr

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Objects, Isometric Views of lines, Planes, Simple and compound Solids; Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of Units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance.

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Outcome:-

Student's ability to hand letter will improve.

1. Student's ability to perform basic sketching techniques will improve.
2. Students will be able to draw orthographic projections and sections.
3. Student's ability to use architectural and engineering scales will increase.
4. Students ability to produce engineered drawings will improve
5. Student's ability to convert sketches to engineered drawings will increase.
6. Students will become familiar with office practice and standards.
7. Students will become familiar with Auto Cad two dimensional drawings.

Students will develop good communication skills and team work.

References:-

1. Bhatt N.D., Paschal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. CAD Software Theory and User Manuals


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BEESC-105
Engineering Graphics

BEESC-105	Engineering Graphics	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiments:-

1. Sketching and drawing of geometries and projections based on above syllabus
2. Term work: A min. of 30 hand drawn sketches (on size A4 graphic sketch Book) plus 5 CAD-printouts on size A4 sheets plus 10 sheets of size A2 or 6 sheets of size A1, (50% marks to be allotted for this record + 25% marks for attendance +25%marks for Teachers Assessment)


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BEESC-106
Manufacturing Practices

BEESC-106	Manufacturing Practices	0L:0T:2P	1 credits	2Hrs/Week
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Preamble:-

1. To understand process of cutting shaping.
2. To understand working principles for various machining processes.
3. To understand construction, working and applications of various machine tools.
4. To learn basic set up, working and applications of a few important non conventional machining processes to get hand on experience on various machine tools.

Manufacturing is fundamental to the development of any engineering product. The course on Engineering Workshop Practice is intended to expose engineering students to different types of manufacturing / fabrication processes, dealing with different materials such as metals, ceramics, plastics, wood, glass etc. While the actual practice of fabrication techniques is given more weightage, some lectures and video clips available on different methods of manufacturing are also included.

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Carpentry
5. Plastic molding, glass cutting
6. Metal casting
7. Welding (arc welding & gas welding), brazing

List of Experiments:-

1. Carpentry Shop Experiment To Make a T-LAP joint with wood Pieces
2. Machine Shop Experiment To Perform Knurling on Iron Rod
3. WELDING SHOP (LAP Joint) , Tools, Accessories, Diagram And Explanation
4. SHEET METAL SHOP (Square Tray) , Parts, Accessories, Diagram And Explanation
5. FITTING SHOP (Make a Joint) , Parts, Accessories, Diagram And Explanation
6. CARPENTRY SHOP (T-Lap Joint) , Cutting Tools, Accessories, Diagram and Explanation
7. MACHINE SHOP (the lathe machine) , Parts, Accessories, Diagram and Explanation

Outcome:-

1. The students will be able to understand the details about machines used in production.
2. The students will be able to understand the mechanics behind metal cutting.
3. The students will be able to understand the finishing and super finishing processes.
4. The students will be able to understand the Physics of material removal behind the various non-conventional machining processes.

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BELC-107
Self Study / GD Seminar

BELC-207	Self-Study / GD Seminar	0L:0T:2P	1 credits	2Hrs/Week
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Preamble:-

To improve the mass communication and convincing / understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty based on group discussion and power point presentation.

Outcome:-

- Analytical thinking
- Lateral thinking
- constructive argument
- Communication skill
- Presentation of views

Students will discuss the course related and interdisciplinary topics for problem solving. They will improve the mass communication and convincing / understanding skills about subject and their related problem in a group of students

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Scheme of Examination
Bachelor of Engineering (CS, CE, ME, AE, MI, EI)
II Semester / I Year
Academic Year 2019-20

GROUP - B

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEESC-201	Mathematics-II	60	30	10	-	-	100	3	-	-	3
2	BEESC-102	Engineering Chemistry	60	30	10	30	20	150	3	-	2	4
3	BEHSMC-103	English for Communication	60	30	10	30	20	150	3	-	2	4
4	BEESC-104	Basic Electrical & Electronics Engineering	60	30	10	30	20	150	2	-	2	3
5	BEESC-105	Engineering Graphics	60	30	10	30	20	150	2	-	2	3
6	BEESC-106	Manufacturing Practices	-	-	-	30	10	40	-	-	2	4
7	BELC-207	Industrial Training	-	-	-	-	10	10	-	-	2	1
		Total	300	150	50	130	100	750	13	1	12	20

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II SEMESTER

BEBS-201 Mathematics-II

BEBS-201	Mathematics-II	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

1. To introduce the basic concepts required to understand, construct, solve and interpret differential equations.
2. To teach methods to solve differential equations of various types.
3. To give an ability to apply knowledge of mathematics on engineering problems

Unit - I Ordinary Differential Equations I

6 Hr

Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

UNIT-II Ordinary differential Equations II

6 Hr

Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Unit III Partial Differential Equations

10 Hr

Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

Unit IV Functions of Complex Variable

10 Hr

Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, theorem, Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral

Unit V Vector Calculus

10 Hr

Differentiation of Vectors, Scalar and vector point function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.

Outcome:-

The students will be able to :

1. Classify differential equations according to certain features.
2. Solve first order linear equations and nonlinear equations of certain types and interpret the solutions.

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3. Understand the conditions for the existence and uniqueness of solutions for linear differential equations
4. Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions
5. Find series solutions about ordinary and regular singular points for second order linear differential equations.
6. Solve initial value problems using the Laplace transform.
7. Solve systems of linear differential equations with methods from linear algebra

References :-

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig , Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. Dip Rima, Elementary Differential Equations and Boundary Value Problems, 9th Ed., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Codington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Inca, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010


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BEBSC- 202
Engineering Physics

BEBSC- 202	Engineering Physics	2L:1T:0P	3 credits	3Hrs/Week
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Preamble:-

- A comprehensive, high-quality education in the physical sciences
- A flexible curriculum with multiple concentrations that allows students to tailor their education according to their specific interests
- The opportunity to experience the excitement of scientific discovery through direct participation in faculty research
- An increased awareness of the physical processes in the surrounding world
- The essential knowledge and analytical, mathematical and computational tools with which to pursue post-graduate education in a variety of physics-related and other fields
- The foundation and practical skillsets for eventual success in any of a broad array of careers
- The motivation for a lifelong love of learning

Unit I Relativistic Mechanics:

6 Hr

Frame of reference, Inertial & non-inertial frames, Galilean transformations, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Velocity addition theorem, Variation of mass with velocity, Einstein's mass energy relation, Relativistic relation between energy and momentum, Massless particle.

Unit II Solid state & Nuclear physics

10 Hr

Free electron theory of metals, Qualitative discussion of Kronig-penny model and origin of energy bands. Intrinsic and Extrinsic Semiconductors. V-I Characteristics of PN junction diode, Zener diode, Hall-effect.

Introduction to Nuclear Physics , Static properties of Nucleus, Nuclear liquid drop model, Nuclear Shell Model, Linear particle accelerator, Cyclotron, Betatron, Bainbridge mass spectrometer.

Unit III Quantum Mechanics:

6Hr

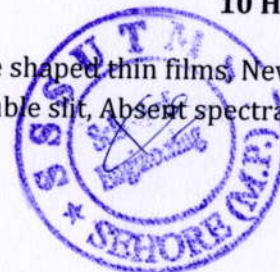
Introduction to Quantum mechanics, Wave particle duality, Matter waves, Particle velocity, Phase velocity , Group velocity and their relation. Heisenberg's Uncertainty Principle. Time-dependent and time-independent Schrodinger wave equation, Solution to stationary state Schrodinger wave equation for one-Dimensional particle in a box, Compton effect.

Unit IV Wave Optics:

10 Hr

Interference :Coherent sources, Interference in uniform and wedge shaped thin films, Newton's Rings and its applications. Fraunhofer diffraction at single slit and at double slit, Absent spectra, Diffraction

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grating, Spectra with grating, Dispersive power of grating, Rayleigh's criterion of resolution. Resolving power of grating and Prism.

Unit V Fibre Optics & Lasers: Fibre Optics

10 Hr

Introduction to fibre optics, Acceptance angle, Numerical aperture, Normalized frequency, Classification of fibre, Attenuation and Dispersion in optical fibres.

Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Einstein's coefficients, Population inversion, Various levels of Laser, Ruby Laser, He-Ne Laser, Laser applications.

Outcome:-

- an ability to apply knowledge of mathematics, science, and engineering.
- an ability to design and conduct experiments, as well as to analyze and interpret data.
- an ability to design a system, component, or process to meet desired needs within realistic constraints.
- an ability to function on multidisciplinary teams.
- an ability to identify, formulate, and solve engineering problems.
- an understanding of professional and ethical responsibility.
- an ability to communicate effectively.
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- a recognition of the need for, and an ability to engage in life-long learning.
- a knowledge of contemporary issues.
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Reference Books: -

1. Concepts of Modern Physics - AurthurBeiser (Mc-Graw Hill)
2. Introduction to Special Theory of Relativity- Robert Resnick (Wiley)
3. Optics - Brijlal& Subramanian (S. Chand)
4. Engineering Physics: Theory and Practical- Katiyar and Pandey (Wiley India)
5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)
6. Engineering Physics-Malik HK and Singh AK (McGrawHill)


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BEBSC- 202
Engineering Physics

BEBSC- 202	Engineering Physics	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiments: -

1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the energy band gap of a given semiconductor material.
4. To determine the plank's constant with help of photocell.
5. Resolving Power of Telescope.
6. V-I Characteristics of P-N Junction diode.
7. Zener diode characteristics.
8. To determine the dispersive power of prism.


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Unit V Data base Management System

10 Hr

Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages. Cloud computing: definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public' private, community and hybrid clouds), Pros and Cons of cloud computing

Outcome:-

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Reference books:

1. Introduction of computers: Peter Norton, TMH
2. Object oriented programming with c++ :E.Balaguruswamy, TMH
3. Object oriented programming in C++: Rajesh k.shukla ,Wiley India
4. Computer network: Andrew Tananbaum, PHI
5. Data base management system, Korth, TMH
6. Operating system-silberschatz and Galvin-Wiley India

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BTEESC-203
Basic Computer Engineering

BTEESC-203	Basic Computer Engineering	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiment:-

1. Study of input and output devices of computer systems .
2. Write a program of addition, subtract, multiplication and division by using C.
3. Write a program to check weather a number is prime or not.
4. Study of various types of Operating System.
5. Study and practice of basic Linux commands-ls, cp, mv, rm, chmod kill, ps etc.
6. Design color coding of straight & crossover cable.
7. Installation of oracle 10g. Also create a employee table.


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BEESC-204
Basic Mechanical Engineering

BEESC-204	Basic Mechanical Engineering	2L:0T:0P	2 credits	2Hrs/Week
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Preamble:-

- To provide a comprehensive knowledge of basic mechanical systems.
- Basic concepts from mechanical engineering sciences,
- Basic concepts I.C Engine
- Modern engineering tools (machine-tools, laboratory instrumentation, Working principle of steam Engine), and related subjects to design mechanical engineering components

Unit I Materials

6 Hr

Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness ductility, brittleness , malleability etc. of materials , Tensile test- Stress-strain diagram of ductile and brittle materials ,

Unit II Measurement

10 Hr

Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set. Production Engineering: Elementary theoretical aspects of production processes like casting, carpentry, welding etc Introduction to Lathe and Drilling machines and their various operations.

Unit III Fluids

6Hr

Fluid properties pressure, density and viscosity etc. Types of fluids , Newton's law of viscosity , Pascal's law , Bernoulli's equation for incompressible fluids, Only working principle of Hydraulic machines, pumps, turbines, Reciprocating pumps .

Unit IV Thermodynamics

10Hr

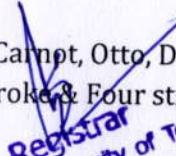
Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy.

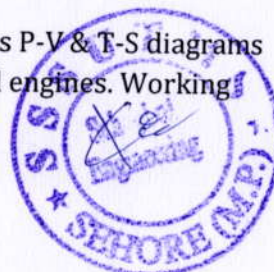
Steam Engineering: Classification and working of boilers, mountings and accessories of boilers, Efficiency and performance analysis, natural and artificial draught, steam properties, use of steam tables.

Unit V Reciprocating Machines

10 Hr

Working principle of steam Engine, Carnot, Otto, Diesel and Dual cycles P-V & T-S diagrams and its efficiency, working of Two stroke & Four stroke Petrol & Diesel engines. Working principle of compressor.


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Outcome:-

- After successful completion of this course students will able to
- To describe and use basic engineering concepts
- principles and components of mechanical equipment
- measuring & testing method of physical quantities
- Assessment of boiler component.

References :-

- 1- Kothandaraman & Rudramoorthy, Fluid Mechanics & Machinery, New Age .
- 2- Nakra & Chaudhary , Instrumentation and Measurements, TMH.
- 3- Nag P.K, Engineering Thermodynamics , TMH .
- 4- Ganesan , Internal Combustion Engines, TMH .
- 5- Agrawal C M, Basic Mechanical Engineering ,Wiley Publication.
- 6- Achuthan M , , Engineering Thermodynamics ,PHI


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BEESC-204
Basic Mechanical Engineering

BEESC-204	Basic Mechanical Engineering	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiments:-

- 1- Study of Universal Testing machines.
- 2- Linear and Angular measurement using, Micrometer, Slip Gauges, Dial Gauge and
- 3- Study of Lathe Machine.
- 4- Study of Drilling Machines.
- 5- Verification of Bernoulli's Theorem.
- 6- Study of various types of Boilers.
- 7- Study of different IC Engines.
- 8- Study of different types of Boilers Mountings and accessories.


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BEESC-205
Basic Civil Engineering & Mechanics

BEESC-205	Basic Civil Engineering & Mechanics	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

The goal of this Engineering Mechanics course is to expose students to problems in mechanics as applied to plausibly real-world scenarios. Problems of particular types are explored in detail in the hopes that students will gain an inductive understanding of the underlying principles at work; students should then be able to recognize problems of this sort in real-world situations and respond accordingly.

The civil engineering program will serve Connecticut and the nation by providing a quality engineering education that enables students to enter a profession that can improve the civil infrastructure, and economic welfare. Our civil engineering program will maintain a strong emphasis on undergraduate education with the goal that our program will be recognized for quality instruction in civil engineering analysis and design

Unit I Building Materials & Construction

10 Hr

Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

Unit II Surveying & Positioning

10 Hr

Introduction to surveying Instruments – levels, theodolites , plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal levelling .

Unit III Basics of Engineering Mechanics covering

10 Hr

Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces ,Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

Unit IV Centroid and Centre of Gravity covering

(10 Hrs):

Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

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Unit V Friction covering

(10 Hrs):

Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames

Outcome:-

- Demonstrate knowledge of various surveying methods.
- Conduct a chain survey.
- Conduct a compass survey.
- Conduct levelling survey and be able to do RL calculations.
- Demonstrate knowledge of properties of various building materials.
- Draw free body diagrams and determine the resultant of forces and/or moments.
- Determine the centroid and second moment of area of sections.
- Apply laws of mechanics to determine efficiency of simple machines with consideration of friction.
- Analyse statically determinate planar frames.

Reference Books:

1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication.
3. Punmia, B.C., Surveying, Standard book depot.
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI

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BEESC-205
Basic Civil Engineering & Mechanics

BEESC-205	Basic Civil Engineering & Mechanics	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiments:-

1. To perform traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch's rule.
2. To perform leveling exercise by height of instrument of Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the workability of fresh concrete of given proportions by slump test or compaction factor test.
6. To determine the Compressive Strength of brick .
7. To determine particle size distribution and fineness modulus of coarse and fine Aggregate.
8. To verify the law of Triangle of forces and Lami's theorem.
9. To verify the law of parallelogram of forces.
10. To verify law of polygon of forces
11. To find the support reactions of a given truss and verify analytically.
12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
13. To determine the moment of inertia of fly wheel by falling weight method.

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BEHSMC-206

Language Lab and Seminar

BEHSMC-206	Language Lab and Seminar	0L:0T:2P	1 credits	2Hrs/Week
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Preamble:-

This course intends to impart practical training in the use of English Language for Communicative purposes and aims to develop students' personality through language Laboratory.

Topics to be covered in the Language laboratory sessions:

1. Introducing oneself, family, social roles.
2. Public Speaking and oral skills with emphasis on conversational practice, extempore speech, JAM(Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.
3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. To write a book review. Standard text must be selected by the teacher.
5. Role plays: preparation and delivery topic to be selected by teacher/faculty.
- 6.


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BELC 207
Industrial Training

BELC 207	Industrial Training	0L:0T:2P	1 credits	2Hrs/Week
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- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.


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Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)
Scheme of Examination
Bachelor of Engineering (Civil Engineering)

III Semester/ II Year

Academic Year 2019-20

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assignments/Quizzes	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	BEA-301	Mathematics -III	60	30	10	-	-	100	3	-	-	3
2	CEA-302	Construction Materials	60	30	10	-	-	100	3	1	-	4
3	CEA-303	Surveying	60	30	10	30	20	150	2	-	2	3
4	CEA-304	Building Planning & Architecture	60	30	10	30	20	150	2	1	2	4
5	CEA-305	Strength of Materials	60	30	10	30	20	150	3	-	2	4
6	CEA-306	Ancient Construction Techniques	-	-	-	30	20	50	-	-	2	1
7	CEA-307	Self study /GD Seminar	-	-	-	-	50	50	-	-	2	1
TOTAL			300	150	50	120	130	750	13	2	10	20

w.e.f. July 2019



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III SEMESTER

BEA- 301 Mathematics-III

BEA- 301	Mathematics-III	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

The course is aimed to develop the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve on basic tools for specialized studies in many fields of engineering and technology.

UNIT-I

10hr

Numerical Methods - 1 Solution of polynomial and transcendental equations - Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT-II

10hr

Numerical Methods - 2 Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidel, and Relaxation method.

UNIT-III

12hr

Numerical Methods - 3 Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predictor-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

UNIT-IV

10hr

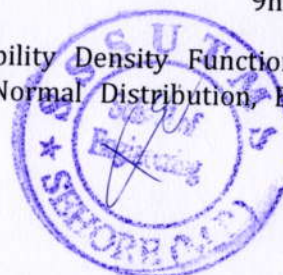
Transform Calculus: Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

UNIT-V

9hr

Concept of Probability: Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.


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Outcome:-

On completion of this course, students are able

- to know how root finding techniques can be used to solve practical engineering problems.
- to apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem
- to apply the analytical technique to express periodic function as a Fourier sine and cosine series.
- to apply partial differential techniques to solve the physical engineering problems.
- to implement integration technique to determine the extreme values of a functional.

Textbooks/References:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics


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CEA- 302
Construction Materials

BEA- 302	Construction Materials	3L:1T:0P	4 credits	4Hrs/Week
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Preamble:-

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

UNIT-I

10hr

Stones, Brick, Mortar and Concrete: Stones :Occurrence, Classification of Rocks, varieties, Characteristics and their testing, uses, quarrying and dressing of stones, Deterioration of Stones, Retardation of Decay of Stones, Preservation of Stones, Artificial Stones. Brick : Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table Concrete : Ingredients, Grades of Concrete ,Concrete Production ,Special Concrete

UNIT-II

10hr

Timber ,Glass , Steel and Aluminium : Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, ,Plywood, Particle Board ,Fibre Board, Applications of wood and wood products , Plaster Boards, Adhesives, types of Gypsum Board and their uses Glass: What is glass , Nature of Glass, Structure of Glass, Macro Molecular Structure, Main Oxides in Glass, Thermal and Optical Properties ,Effect of Coating, Steel : Physical Properties of Structural Steel, Grades of Steel Aluminium : Properties ,Forms ,Uses, Advantages

UNIT-III

6hr

Flooring , Roofing ,Plumbing and Sanitary Material: Flooring and Roofing tiles , Types of Flooring – Marble, Kota stone , wood etc. Type of Roofing , P.V.C. materials, CI , GI, Asbestos pipe , Stone ware pipes

UNIT-IV

7hr

Paints, Enamels and Varnishes: Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish

UNIT-V

10hr


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Miscellaneous Construction Materials: Bitumen, Tar and Asphalt their characteristics and uses ,Ultra Poly Vinyl chloride Pipes, Thermal and sound insulating materials, and water proofing materials .

Outcome:-

On completion of this course the students will be able to

- Compare the properties of most common and advanced building materials.
- understand the typical and potential applications of lime, cement and aggregates
- know the production of concrete and also the method of placing and making of concrete elements.
- understand the applications of timbers and other materials
- Understand the importance of modern material for construction.

References Books:

1. Donald R Askeland, Pradeep P Fulay, Wendelin J Wright, The science and Engineering of Materials, Cengage Learning.
 2. S K Duggal, Building Materials, New Age International.
 3. P C Vaghese, Building Materials, PHI Learning.
 4. S.C. Rangwala, Engineering Materials, Charotar.
 5. M S Shetty, Concrete Technology, S. Chand Technical.
- A M Neville, J J Brooks, Concrete Technology, Prentice Hall.


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**CEA- 303
Surveying**

BEA- 303	Surveying	2L:0T:0P	2 credits	2Hrs/Week
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Preamble:-

- To introduce the rudiments of plane surveying and geodetic principles to Civil Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world Civil Engineering problems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

UNIT-I

10hr

Surveying & Levelling : Basic Definitions of Surveying, Principles , Classification of surveying ,Methods of Linear Measurement Ranging , Accessories for linear measurement ,Chain Surveying , Compass Surveying , Plane Table Surveying ,Correction and Errors Definition of Levelling , types of levelling operations ,Principles , Problems , Computation of Area and Volumes

UNIT-II

8hr

Theodolite Traversing: Types, Temporary Adjustment ,latitude & Departure ,plotting & Adjustment ,Omitted Measurements EDM , Trigonometric Levelling

UNIT-III

10hr

Tacheometry: Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, subtense system, instrument constant, field work reduction, direct-reading tacheometer , use of tacheometry for traversing and contouring.

UNIT-IV

9hr

Curves: Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, vertical curves, setting out.

UNIT-V

10hr

Hydrographic Survey: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Setting out works.

Outcome:-

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

- The use of various surveying instruments and mapping
- Measuring Horizontal angle and vertical angle using different instruments


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- Methods of Leveling and setting Levels with different instruments
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
- Concept and principle of modern surveying.

References Books:-

1. B.C Punmia , Surveying Vol-II & III ,Laxmi Publication.
2. S.K. Duggal, Surveying Vol. II McGraw Hill Publishing Company Ltd.
3. Saikia MD, Das BM, Das MM, Surveying, McGraw hill
4. T.P. Kanetkar and S.V. Kulkarini Surveying and Leveling-Part-I & II , Pune VidyarthiGrihaPrakashan, Pune.
5. Gopi A, Satikumar R- Advance surveying, Pearson 6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.
7. R.Agor, Advance Surveying ,Khanna Publisher
8. Chandra AM, Higher Surveying, New Age International, new Delhi
9. Bhavikatti SS, Surveying and Levelling Vol. II, I.K International
10. Venkatramaiah, Surveying, University Press, Mumbai
11. BhattaBasudeb, , Remote Sensing and GIS, Oxford, New Delhi.
12. Subramanaian, Surveying &levelling, Oxford, New Delhi.
13. Joseph George Fundamentals of Remote Sensing



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CEA- 304
Building Planning & Architecture

BEA- 304	Building Planning & Architecture	2L:1T:0P	3 credits	3Hrs/Week
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Preamble:-

- To understand the concept of building planning and architecture.
- To understand the various building codes to be followed while planning a building.
- To have the knowledge of various building components.

UNIT-I

10hr

Drawing of Building Elements- Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UNIT-II

13hr

Building Planning- Classification of buildings, Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks, FAR terminology, Design and drawing of Building, Design concepts and philosophies, Preparing sketch plans and working drawings of various types of buildings like residential building, institutional buildings and commercial buildings, site plans, presentation techniques, pictorial drawings, perspective and rendering, model making, introduction to computer aided design and drafting, Applying of principle of architectural composition (i.e. unity, contrast, etc.), Principles of planning, orientation in detailed drawings.

UNIT-III

12hr

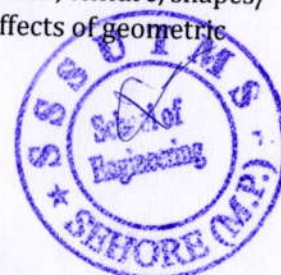
Building Services- Introduction of Building Services like water supply, sewerage and drainagesystems, sanitary fittings and fixtures, plumbing systems, principles of internal & external drainage systems, principles of electrification of buildings, intelligent buildings, elevators & escalators their standards and uses, air-conditioning systems, fire-fighting systems, buildingsafety and security systems, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT-IV

13hr

Principles of architectural design- Definition of architecture, factors influencing architectural development, characteristics features of style, historic examples, creative principles. Principles of architectural composition- Unity, balance, proportion, scale, rhythm, harmony, Accentuation and contrast. Organising principles in architecture- Symmetry, hierarchy, axis, linear, concentric, radial, and asymmetric grouping, primary and secondary masses, Role of colour, texture, shapes/ forms in architecture. Architectural space and mass, visual and emotional effects of geometric


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forms, space activity and tolerance space. Forms related to materials and structural systems. Elements of architecture: Functions – Pragmatic utility, circulatory function, symbolic function, Physiological function. Structure – Physical structure, Perceptual structure. Space in architecture Positive and negative space. Aesthetics: Visual perception. Protective: Protection from climate and other elements, architecture a part of the environment. Comfort factors.

UNIT-V

12hr

Perspective Drawing and Town Planning- Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings. Concepts of master plan, structure plan, detailed town planning scheme and action plan, estimating future needs - planning standards for different land use, allocation for commerce, industries, public amenities, open areas etc., planning standards for density distributions, density zones, planning standards for traffic network, standard of roads and paths, provision for urban growth, growth models, plan implementation, town planning legislation and municipal acts, panning of control development schemes, urban financing, land acquisition, slum clearance schemes, pollution control aspects

Outcome:-

- Understanding of building planning, orientation, drawing and architectural aspects.
- Representation of a building on Paper.

References Books:

1. Shah, Kale & Patki; Building Design and Drawing; TMH
2. Malik & Meo; Building Design and Drawing
3. W B Mckay, OrientBlackswan Building Construction Vol 1 -4, Pearson
4. Gurucharan Singh and Jagdish Singh, Building Planning, Designing and Scheduling, Standard Publishers Distributors.
5. Loyal JS, Dongre A, Building Design and Drawing, SatyaPrakashan
6. Ghose D.N., Civil Engineering Design and Drawing, CBS publisher
7. Das B M, Principles of Foundation Engineering, Cengage Learning.
8. Agrawal S. C., Architecture and Town Planning, DhanpatRai & Co.
9. S.C. Rangwala, Town Planning, Charotar Publishing House.
10. Lewis Keeble, Principles and Practice of Town and Country Planning.
11. Rame Gouda, Principles & Practices of Town Planning, University of Mysore, ManasaGangotri.


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CEA- 304
Building Planning & Architecture

BEA- 304	Building Planning & Architecture	0L:0T:2P	1credits	2Hrs/Week
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List of Experiments:-

1. Sketches of various building components.
2. Drawing of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. Drawings for services and interiors of buildings.
4. Drawings containing detailed planning of one/two bed room residential building (common to all student)
5. Drawing of residential and institutional building (Each student performs a different drawing).
6. Use of Auto CAD for preparation of drawings.


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CEA-305
Strength of Materials

BEA- 305	Strength of Materials	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

- To learn the fundamental concepts of Stress, Strain and deformation of solids.
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyze plane and space trusses

9hr

UNIT- I

Simple Stress and Strains: Concept of Elastic body stress and Strain, Hooke's law, Various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains- Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and Strains, Mohr's circle of stresses.

UNIT- II

10hr

Bending and Shearing Stresses: Theory of simple bending, Concept of pure bending and bending stress, Equation of bending, Neutral axis, Section-Modulus, Differential equation of the elastic curve, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading, Bending stress distribution across a section of beam, Shearing Stress and shear stress distribution across a section in Beams.

UNIT- III

9hr

Determination of Slope and Deflection of beams by Double Integration Method, Macaulay's Method, Area Moment Method, Conjugate Beam Method, and Strain Energy Method, Castiglione's Method, and Unit Load Method.

UNIT- IV

10hr

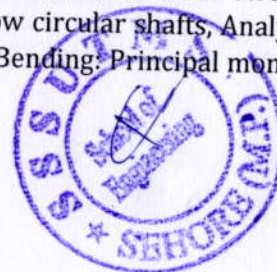
Columns and Struts: Theory of columns, Slenderness ratio, Direct and bending stresses in short columns, Kern of a section. Buckling and stability, Euler's buckling/crippling load for columns with different end conditions, Rankin's formula, Eccentric loads and the Secant formula Imperfections in columns. Thin Pressure Vessels: cylinders and spheres. Stress due to internal pressure, Change in diameter and volume. Theories of failure.

UNIT- V

12hr

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsion of solid and hollow circular shafts, Analyses of problems based on combined Bending and Torsion. Unsymmetrical Bending: Principal moment of

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Inertia, Product of Inertia, bending of a beam in a plane which is not a plane of, symmetry. Shear centre; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Outcome:-

Students will be able to

- Understand the concepts of stress and strain, principal stresses and principal planes.
- Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
- Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
- Apply basic equation of torsion in design of circular shafts and helical springs, .
- Analyze the pin jointed plane and space trusses

Reference Books:-

1. Punmia B.C., Mechanics of Materials, ,Laxmi Publications (P) Ltd.
2. S.S Bhavikaati, Strength of Materials, Vikas Publisher, new Delhi
3. Rajput R. K., Strength of Materials, S. Chand.
4. S. Ramamrutham, R. Narayanan, Strength of Materials, DhanpatRai Publications.
5. R. Subramaniam, Strength of Materials, Oxford University Press.
6. Sadhu Singh , Strength of Material , Khanna Publishers
7. Mubeen A , Mechanics of solids , Pearsons.
8. D.S PrakashRao, Strength of Material , University Press , Hyderabad
9. Debrath Nag, Strength of Material , Wiley
10. Jindal , Strength of Material , Pearsons.
11. Bansal R.K, Strength of Materials, Laxmi Publisher, New Delhi.
12. Nash, W.A., Strength of Materials, Mcgraw hills, New Delhi.
13. Chandramouli, Strength of Materials, PHI learning
14. Dongre A.P., Strength of Materials, Scitech, Chennai
15. Negi L. S ,Strength of Materials, McGraw Hill Professional.
16. Raj Puroshattam, Strength of Material , Pearsons
17. J.M. Gere,,J. G. Barry Mechanics of Material, Cengage Learning

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CEA-305
Strength of Materials

BEA- 305	Strength of Materials	0L:0T:2P	1 credits	2Hrs/Week
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List of Practicals :-

1. Study of Universal testing machine
2. To determine the compressive and tensile strength of materials.
3. To determine the Brinell hardness of materials.
4. To determine the Rockwell hardness of materials
5. To determine the toughness of the materials.
6. To determine the stiffness of the spring.
7. To determine the deflection of beam by the use of deflection-beam apparatus.


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CEA- 306
Study of Historical & Ancient Civil Engineering Practices

BEA- 306	Study of Historical & Ancient Civil Engineering Practices	0L:0T:2P	1credits	2Hrs/Week
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Preamble:-

To understand study the various aspects of civil engineering practices in ancient and historical structures.

- Course Contents –
1. General Study of ancient monuments e.g. Forts, Bridges, Buildings and various other civil engineering related structures.
 2. Environmental practices adopted in construction of historical structure during ancient/medieval period.
 3. Construction techniques and materials used in historical structures.
 4. Various planning aspects adopted in historical structures.
 5. Visit of various historical structures and museums to understand history of civil engineering practices.

List of Practicals :-

1. Detailed study report on various aspects e.g. environmental practices, constructions techniques and materials, planning etc. of any one important ancient structure along with relevant sketches/drawings etc. and its presentation before departmental committee.


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Scheme of Examination

Bachelor of Engineering (Civil Engineering)
IV Semester/ II Year

S.No.	Subject Code	Subject Name	Maximum Marks Theory Slot				Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assignments/Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation	L		T	P		
												60	
1	BEA-401	Energy, Ecology, Environment and Society	60	30	10	-	-	100	3	-	-	3	
2	CEA-402	Construction Technology	60	30	10	30	20	150	3		2	4	
3	CEA-403	Structural Analysis-I	60	30	10	30	20	150	3		2	4	
4	CEA-404	Transportation Engineering-I	60	30	10	30	20	150	2	1	2	4	
5	CEA-405	Engineering Geology & Remote Sensing	60	30	10	30	20	150	2	1	2	4	
6	CEA-406	Software lab	-	-	-	30	20	50	-	-	2	1	
7	CEA-407	Industrial Training-I	To be completed during fourth semester semester break. Its evaluation/credit to be added in fifth semester										
TOTAL			300	150	50	150	100	750	13	2	10	20	

SSSUTMS

w.e.f. July 2019



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IV SEMESTER

BEA-401 Energy, Ecology, Environment and Society

BEA- 401	Energy, Ecology, Environment and Society	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

UNIT-1

7 Hr

Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydro, nuclear sources.

UNIT-2

9Hr

Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem - Water, Carbon, Nitrogen. Biodiversity: Threats and conservation

UNIT-3

10 Hr

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non - industrial.

UNIT-4

8Hr

Water Pollution- Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil Pollution - Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

UNIT-5

12Hr

Society, Ethics & Human values- Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

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Outcome:-

- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.

References Books:-

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunningham WP and MA; principles of Environment Sc; TMH
11. Gandhiji M.K.- My experiments with truth


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CEA- 402
Construction Technology

BEA- 402	Construction Technology	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

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

UNIT-I

10Hr

Design features and construction of Foundations Introduction and essential requirements of foundations, footing types and depth of footings, contact pressure below footings such as strip footings, isolated footings, eccentrically loaded footings, Grillage foundations, , design features and construction detail of combined footing, strap footing, problem of frost heave, its causes and prevention, effect of ground water on footings. Purpose of pile foundation, classification based on different criterion and types, advantages and disadvantages, selection of pile type, pile action, behaviour of pile and pile group under load, definition of load failure.

UNIT-II

7Hr

Formwork and Temporary Structures Design and construction features of different types of temporary structures, stationary and slip form work techniques, special features of in-sit construction, stripping and removal of formworks, formworks for special structures, e. g. shells bridges towers etc.

UNIT-III

12Hr

Masonry and walls Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, brick cavity walls, code provisions regarding load bearing and nonload bearing walls, common defect in construction and their effect on strength and performance of walls, Design of brick masonry, precast stone masonry, hollow concrete block and hollow block masonry walls, plastering and pointing, white and colour washing, distempering, dampness and its protection. Doors windows and ventilators: types based on materials etc. size location fittings, construction sunshades, Sills and jambs, RCC doors/windows frames, Stair types, rules of proportionality, etc., Repair Techniques for masonry, walls, doors and windows.

UNIT-IV

12Hr

Construction of Floors Ground floor-introduction, Components of a floor, Materials for construction, Selection of flooring material, Construction of Various types of floorings such as Mud, Brick, Cement,

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Terrazzo, Mosaic, Tiled, Marble, Rubber, Glass and plastic floorings etc., Upper floor- Introduction, construction of Slab floors, Jack arch floors, RCC floors, Ribbed or Hollow tiled flooring, Filler Joist floors, Pre-cast concrete floors, Timber floors etc. Repair Techniques for floors. Construction of Roofs Introduction and types of roofs, Construction of Pitched roofs, single roofs, double or purlin roofs, trussed roofs, steel roof trusses etc. roof coverings for pitched roofs and flat terraced roof etc. Repair Techniques for roofs.

UNIT-V

7Hr

Construction of Earthquake Resistant Building Planning of earthquake resistant building, Construction of walls – provision of corner reinforcement, construction of beams and columns, Base isolation.

Outcome:-

On completion of this course the students will be able to

- compare the properties of most common and advanced building materials.
- understand the typical and potential applications of these materials
- understand the relationship between material properties and structural form
- understand the importance of experimental verification of material properties

Reference Books :-

1. Mohan Rai & M. P. Jai Singh, Advances in Building materials and Constructions.
2. S. P. Arora and S. P. Bindra, A text Book of Building Construction-Dhanpat Rai and Sons, New Delhi.
3. S. K. Sarkar and Saraswati, Construction Technology- Oxford University Press, New Delhi.
4. Sushil Kumar, Building Construction.
5. B. C. Punmia , Building Construction.
6. Metchell , Building Construction.
7. Chudley R., Construction Technology.
8. Dr. K.R. Arora Soil Mechanics & Foundation Engg - Std. Publishers Delhi
9. B.C. Punmia, Soil Mechanics & Foundation Engg. - Laxmi Publications Delhi

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CEA- 402
Construction Technology

BEA- 402	Construction Technology	0L:0T:2P	1credits	2Hrs/Week
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List of Experiments : -

1. Tests on Bricks
2. Tests on Aggregates (fine and Coarse)
3. Tests on Cements and concrete
4. Tests on tiles


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CEA- 403
Structural Analysis-I

BEA-403	Structural Analysis-I	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

- To introduce the students to the basic theory and concepts of classical methods of structural analysis and to analyses the arches and suspension bridges

UNIT-I

10 Hr

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies, Strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

UNIT-II

11Hr

Indeterminate Structures-I: Static and Kinematics indeterminacy, Analysis of Fixed and Continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway)

UNIT-III

10 Hr

Indeterminate Structures - II: Analysis of beams and frames by slope Deflection method, Column Analogy method.

UNIT-IV

12 Hr

Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and Temperature effects.

UNIT-V

Hr

8

Rolling loads and Influence Lines: Maximum SF and BM curves for various types of Rolling Loads, focal length, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.

Outcome:-

Students will be able to

- Analyze the pin-jointed plane and space frames
- Analyze the continuous beams and rigid frames by slope deflection method.
- Understand the concept of moment distribution and analysis of continuous beams and rigid frames

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with and without sway.

- Draw influence lines for statically determinate structures and calculate critical stress resultants.
- Analyze three hinged, two hinged and fixed arches

References:

1. Rammamurtham, Theory of Structures, Dhanpat Rai .
2. Bhavikatti S.S. Analysis of Structures (I&II) Vikas Publication
3. B C Punmia, Theory of Structures, Firewall Media.
4. A Kassimali, Structural Analysis, Cengage Learning.
5. A Ghali, A Neville, T G Brown, Structural Analysis: CRC Press.
6. Hibbler, Structure Analysis -1, Pearson Education India
7. C S Reddy, Basic Structural Analysis, Tata McGraw Hill Publishing Company.
8. Pandit and Gupta, Theory of Structures – I, McGraw Hills
9. West HH, Fundamental of Structural Analysis, Wiley India
10. Das MM, Structural Analysis, PHI
11. Thandavamurthy TS, Structural Analysis, Oxford
12. Muthuku, Azmi I, Basic Structural Analysis, IK International Publisher




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CEA- 403
Structural Analysis-I

BEA- 403	Structural Analysis-I	0L:0T:2P	1credits	2Hrs/Week
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List of Experiments : -

1. To verify Maxwell- Bett's Law.
2. To determine the flexural rigidity of the beam verify it theoretically
3. To determine the deflection of a pin jointed truss and to verify the results theoretically and graphically
4. To verify strain in an externally loaded beam with the help of a strain gauge indicator and to verify theoretically.
5. To study behaviour of different types of columns and find Euler's buckling load for each case.
6. To study two hinged arch for the horizontal displacement of the roller end for a given system of loading and to compare the same with those obtained analytically
7. To study the behaviour of a portal frame under different end conditions.
8. To find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value.
9. To determine the deflection of a pin connected truss analytically & graphically and verify the same experimentally.
10. To verify the Muller Breslau theorem by using Begg's deformatior set.




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CEA- 404
Transportation Engineering -I

BEA- 404	Transportation Engineering -I	2L:1T:0P	3credits	3Hrs/Week
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Preamble:-

To give an overview of Traffic engineering, traffic regulation, management and traffic safety with integrated approach in traffic planning as well.

UNIT-I

14 Hr

Introduction, Tractive resistances & Permanent way : Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations. Route Surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort. 1. Rails: types, welding of rails, wear and tear of rails, rail creep. 2. Sleepers: types and comparison, requirement of a good sleeper, sleeper density. 3. Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails. 4. Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast. Different methods of plate laying, material trains, and calculation of materials required, relaying of track

UNIT-II

10Hr

Geometric Design ; Station & Yards; Points and Crossings & Signaling and interlocking : Formation, cross sections, Super elevation, Equilibrium, Cant and cant deficiency, various curves, speed on curves. Types locations, general equipments, layouts, marshalling yards. Definition, layout details, design of simple turnouts. Types of signals in stations and yards, principles of signaling and interlocking.

UNIT-III


8Hr

Bridge Site Investigation and Planning ; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data : essential surveys, hydraulic design, scour depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges. Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure.

UNIT-IV

8Hr

Bridge Foundations, Construction, Testing and Strengthening of Bridges: Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants, inspection and data collection, strengthening of bridges, Bridge failure.


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UNIT-V

7Hr

Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts. 2. Construction of tunnels in soft soil, hard soil and rock. Different types of lining, methods of lining. Mucking operation, Drainage and ventilation. Examples of existing important tunnels in India and abroad.

Outcome:-

On completing this course, the Students will be able to

- Analyse traffic problems and plan for traffic systems various uses
- Design Channels, Intersections, signals and parking arrangements
- Develop Traffic management Systems

References Books :-

- 1.Chakraborty and Das; Principles of transportation engineering; PHI
- 2.Rangwala SC; Railway Engineering; Charotar Publication House, Anand
- 3.Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
- 4.Ponnuswamy; Bridge Engineering; TMH
- 5.Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
- 6.Railway Track by K.F. Antia 7.Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons 8.Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
- 9.Railway, Bridges & Tunnels by Dr. S.C. Saxena
- 10.Harbour, Docks & Tunnel Engineering - R. Srinivasan
- 11.Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRS codes.


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CEA- 404
Transportation Engineering -I

BEA- 404	Transportation Engineering -I	0L:0T:2P	1 credits	2Hrs/Week
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List of Experiments : -

1. Collection of different types of photographs showing a. Various bridge types b. Rail tracks c. Tunnels
2. Hydraulic design of bridges.
3. Various modern large span bridges: Pre stressed bridges and launching process.
4. Visit of Railway bridges for rehabilitation.
5. Visit of Railway Over Bridges and Under Bridges.


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CEA- 405
Engineering Geology & Remote Sensing

BEA- 405	Engineering Geology & Remote Sensing	2L:1T:0P	3credits	3Hrs/Week
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Preamble:-

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

UNIT-I

10Hr

Introduction and physical geology: branches application and scope of geology, age and parts of the earth, weathering of rocks, geological action of river, ground water, sea and oceans, Concept and causes of earthquakes and volcanoes.

UNIT-II

10Hr

Mineralogy and crystallography: fundamentals of mineralogy, physical properties, study of common rock forming minerals and ore minerals, importance to civil engineering, and element of crystals and introduction to crystal systems.

UNIT-III

8Hr

Petrology: rock cycle, composition, classification and structures of igneous, sedimentary and metamorphic rocks of civil engineering importance, study of common rock types, brief geological history of India.

UNIT-IV

7Hr

Structural geology: dip, strike, outcrops, classification and detailed studies of geological structures i.e. Folds, Faults, Joints, Unconformity and their importance in civil engineering.

UNIT-V

12Hr

Applied geology and remote sensing, engineering properties of rocks, selection of sites for Dam, Tunnel, Reservoirs and Canals, uses of remote sensing technique. Types, components and elements of remote sensing, EMS and MSS, Visual interpretation technique, application of GIS in civil engineering and resource mapping (site selection, water resources, rocks and soil)

Outcome:-

The students completing this course

- Will be able to understand the importance of geological knowledge such as earth,

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& Medical Sciences Sehore (M.P.)



earthquake, volcanism and the action of various geological agencies.

- Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
- Can choose the types of foundations and other related aspects

Reference Books :-

1. Prabin Singh - "Engineering and General Geology"
2. P. K. Mukherjee - "A text Book of Geology"
3. S. K. Garg -- "A text Book of Physical and Engineering Geology"



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CEA- 405
Engineering Geology & Remote Sensing

BEA- 405	Engineering Geology & Remote Sensing	0L:0T:2P	1credits	2Hrs/Week
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List of Experiment's (Expandable)

1. Identification of simple rock forming minerals and important ores.
2. Identification of rocks
3. Simple map Exercises.
4. Field Visit/Geological Excursion


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CEA- 406
Software Lab

BEA- 406	Software Lab	0L:0T:2P	1credits	2Hrs/Week
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Preamble:-

An important distinction in programming languages is the difference between an object-oriented language and an object-based language. A language is usually considered object-based if it includes the basic capabilities for an object: identity, properties, and attributes.

List Of Experiments:

15 Hr

1. Introduction to CAD, Introduction to AutoCAD, Software and hardware requirements, various input and output devices. Getting started with AutoCAD, Setting drawing limits, Units etc.
2. Learning and practice of Draw commands, Modify commands, utility and other commands.
3. Drawing basic Geometric Shapes, Basic Plotting and Editing Tools, Architectural Views & Drafting Views.
4. 3D modelling with AutoCAD
5. Dimensioning, Annotating in AutoCAD with Text & Hatching, Blocks, drafting symbols and Attributes, Layers, Templates & Design Center, Advanced plotting (Layouts, Viewports)
2. Drawing plan, section and elevation of 1 BHK house.


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CEA- 407
Industrial Training -I

BEA- 407	Industrial Training -I	To be completed during fourth semester semester break. Its evaluation/credit to be added in fifth semester
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Preamble:-

The main objective of Industrial Training is to expose the students to actual working environment and enhance their knowledge and skill from what they have learned in the college. Another purpose of this program is to instill the good qualities of integrity, responsibility and self confidence. All ethical values and good working practices must be followed by student.

Duration:- 2 weeks after the IV semester in the summer break, Assessment in V semester.

Students must observe following to enrich their learning during industrial training:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.


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Sri Satya Sai University of Technology and Medical Sciences

(Established under Govt. of M.P. Registered under UGC 2(F) 1956)

Bhopal-Indore Road, Opp. Pachama oilfed plant, Pachama, Dist.-Sehore M.P. PIN-466001
Ph. 07562-223647, Fax : 07562-223644, Web: www.sssutms.co.in, info@sssutms.co.in

Name of Faculty : **School of Engineering**

Name of Department: **Civil Engineering**

Minutes of Board of Studies Committee Meeting Dated on **01.02.2020**

The Board of Studies Committee Meeting was held in the Department of **Civil Engineering** at **2:30 PM.** on **01.02.2020**, Following members were present.

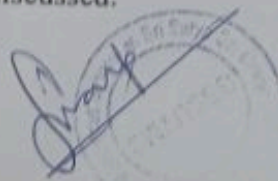
1. Dr. Ajay Swarup Assoc. Prof. (Civil Engineering), - Chairman
2. Dr. P.K. Agrawal Prof. (Civil Engineering, MANIT Bhopal),-External Member
3. Dr. Arun Patel Assoc. Prof. (Civil Engineering, RKDF Bhopal),-External Member
4. Dr. Jayant Mishra, Prof. (Civil Engineering), Member
5. Dr. G M Kapse Prof. (Civil Engineering), Member
6. Ms. Kamni Laheriya, Asstt. Prof. (Civil Engineering), Member
7. Mr. Baldev Barde, Asstt. Prof. (Civil Engineering), Member
8. Mr. Babar Hussain, Asstt. Prof. (Civil Engineering), Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved.

Agenda Preparation of Scheme and syllabus for V to VIII Sem.

1. The chairman informed the committee members that department teams have been working on the curriculum.
2. The members considered the curriculum & discussed different issues. It was pointed out that elective subject & industrial training work should be added to the scheme.
3. The member approved the curriculum for consideration of faculty of civil engineering. The matter regarding the implementation of scheme & syllabus was also discussed.






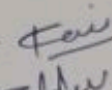
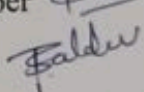
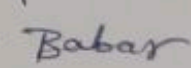
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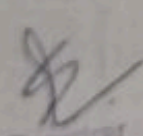
Resolution of the Discussion:

It was resolved that scheme and syllabus as proposed with modification may be accepted
The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr. Ajay Swarup Assoc. Prof. (Civil Engineering), - Chairman 
2. Dr. P.K. Agrawal Prof. (Civil Engineering, MANIT Bhopal),-External Member 
3. Dr. Arun Patel Assoc. Prof. (Civil Engineering, RKDF Bhopal),-External Member 
4. Dr. Jayant Mishra, Prof. (Civil Engineering), Member 
5. Dr. G M Kapse Prof. (Civil Engineering), Member 
6. Ms. Kamni Laheriya, Asstt. Prof. (Civil Engineering), Member 
7. Mr. Baldev Barde, Asstt. Prof. (Civil Engineering), Member 
8. Mr. Babar Hussain, Asstt. Prof. (Civil Engineering), Member 


Chairman


Registrar
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& Medical Sciences, Satara





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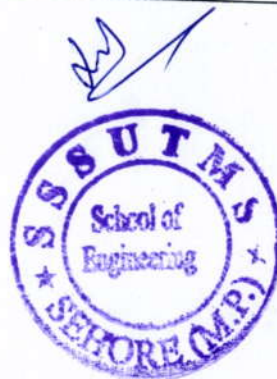
Scheme of Examination

Bachelor of Engineering (Civil Engineering)
V Semester/ III Year Academic Year 2018-19

V SEMESTER

S. No.	Subject Code	Subject Name	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assignments/ Quiz	End Sem. Practical & Viva	Practical Record /Assignment / Quiz / Presentation		L	T	P	
1	CEA-501	Advanced Surveying	60	30	10	30	20	150	2	1	2	4
2	CEA-502	Fluid Mechanics	60	30	10	30	20	150	2	1	2	4
3	CEA-503	Structural Design & Drawing-I (RCC)	60	30	10	30	20	150	2	1	2	4
4	CEA-504	Program Elective-I	60	30	10	-	-	100	3	1	0	4
5	CEA-505	Open Core Elective - I	60	30	10	-	-	100	3	1	0	4
6	CEA-506	Industrial Training-I	-	-	-	150	100	250	-	-	4	2
TOTAL			300	150	50	240	160	900	12	5	10	22
ELECTIVE SUBJECT												
CEA-504 Program Elective-I			(A)Water Resources & Irrigation Engineering				(B)Renewable Energy Sources					
CEA-505 Open Core Elective - I			(A)Remote Sensing & GIS				(B)Highway Engineering					

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V SEMESTER

**CEA-501
Advance Surveying**

CEA-501	Advance Surveying	2L:1T:0P	3 credits	3Hrs/Week
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Preamble:-

The main objectives of the course are

- To make students aware with different advance surveying methodologies applied to carry out large scale survey works as modern instruments have largely changed the approach to survey works with the principles being same.
- To prepare the students to handle the errors they are likely to come across any large scale survey works.

UNIT-I

Modern equipment's for surveying: Digital levels and theodolites, Electronic Distance measurement(EDM), Total Station and Global Positioning Systems (GPS), Digital Planimeter .

UNIT-II

Surveying Astronomy: Definitions of astronomical terms, coordinate systems for locating heavenly bodies, geographic, geodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of latitude and longitude.

UNIT-III

GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datum's, GPS receivers, GPS observation methods and their advantages over conventional methods. Digital Terrain Model (DTM): Topographic representation of the terrain and generation of DTM on computers using spot heights and contour maps.

UNIT-IV

Photogrammetry : Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic.

UNIT-V

Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing

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Satellites (IRS) and applications. Geographic Information Systems (GIS): Definition, components and advantages. Surveying Project - Student will go for one week Surveying Camp to carry out Project Work.

Outcome:-

- On the successful completion of this course the students will get a diverse knowledge of surveying practices applied for real life problems.
- The students will learn to work with various surveying equipment's, like, Theodolite, Total station, etc. in order to apply the theoretical knowledge to carry out practical field work.
- The knowledge of limits of accuracy will be obtained by making measurements with various surveying equipment employed in practice.

References Books :

1. Surveying and Leveling-Part-I & II by T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune
2. Engineering Surveying : Theory and Examination Problems for Students by W. Schofield, Butterworth, Heinemann, Oxford.
3. Surveying: Problems Solving with theory and objective type questions by A.M. Chandra, New Age International Publishers N. Delhi.
4. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
5. Surveying Vol. II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi.
6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.


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CEA-501
Advance Surveying

List of Experiments:-

CEA-501	Advance Surveying	0L:0T:2P	1 credits	2Hrs/Week
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SURVEYING PROJECT:- Student will go for one week surveying camp to carry project


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CEC-502
Fluid Mechanics

CEA-502	Fluid Mechanics	2L:1T:0P	3 credits	3Hrs/Week
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Preamble:-

•To introduce the students about properties of the fluids, behavior of fluids under static conditions and to impart basic knowledge of the dynamics of fluids through the control volume approach and to expose to the applications of the conservation laws to uniform and non-uniform flow in open channel, flow through pipes (both laminar and turbulent) and forces on pipe bends with an exposure to the significance of boundary layer theory and its applications and fluid machines.

UNIT-I

8Hr

Properties of fluid :- Fluid and continuum, Physical properties of fluids. Newtonian and non-Newtonian fluids. Pressure transducers, Pascal's law, pressure variation in a fluid at rest, Hydrostatic law, Manometer, Hydrostatic force on submerged body, Buoyancy and Flotation.

UNIT-II

12Hr

Uniform & Non uniform flow in open channels: Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, Saint Venant equation. Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, Venturi flume

UNIT-III

12Hr

Laminar flow & Turbulent flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically smooth and rough boundaries, Reynolds's experiment, Hagen-Poiseuille Equation, flow of viscous fluids between two parallel plates, Drop of pressure head. Effect of turbulence, Expression for loss of head due to friction in pipes. Resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Pipe flow problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes. Hardy Cross Method.

Unit-IV

7Hr

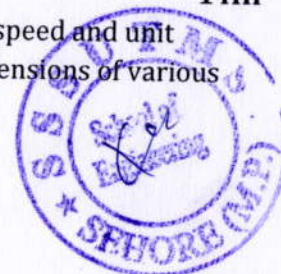
Forces on immersed bodies: Types of drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, Magnus effect.

UNIT-V

14Hr

Fluid Machines: Turbines: Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various


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elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitation. Pumps: Centrifugal pumps: Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, principle of working and characteristic curves. Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

Outcome:-

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

- Demonstrate the difference between solid and fluid, its properties and behavior in static conditions.
- Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies.
- Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.
- Explain the concept of boundary layer and its application to find the drag force exerted by the fluid on the flat solid surface.

Reference Books:

1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi
3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Mechanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak, Delhi-6
5. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
6. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
7. Engineering Hydraulics By H. Rouse
8. Centrifugal & Axial Flow Pump By Stemanoff A.J. New York
9. Relevant IS codes.


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CEC-502
Fluid Mechanics

List of Experiments-

CEA-502	Fluid Mechanics	0L:0T:2P	1credits	2Hrs/Week
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1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Calibration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hyd. Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface Profile over weir
7. Study of the characteristic of the Reciprocating pump
8. To study the variation of friction factor for pipe flow.
9. To determine the head loss for a sudden enlargement.
10. To determine the head loss for a sudden Contraction.
11. To determine of head loss in various pipe fittings.
12. To study of Reynolds experiment for demonstration of stream lines & turbulent flow
13. To study the characteristics of a centrifugal pump


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CEC-503
Structural Design & Drawing-I (RCC-I)

CEA-503	Structural Design & Drawing-I	2L:1T:0P	3credits	3Hrs/Week
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Preamble:-

•To impart knowledge on basic of concepts of design of reinforced concrete structures and to make the students able to design and detail the basic elements like beam, slab, column, footing and staircase.

UNIT -I

10Hr

Basic Principles of Structural Design: Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

UNIT - II

10Hr

Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

UNIT- III

7Hr

Design of Slabs: Slabs spanning in one direction. Cantilever, simply supported and Continuous slabs, Slabs spanning in two directions, Circular slabs, Waffle slabs, Flat slabs, Yield line theory.

UNIT - IV

12Hr

Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

UNIT -V

7Hr

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slab less tread-riser staircase.

Outcome:-

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

- Explain the various design concepts and design a beam under flexure and draw the reinforcement details.
- Design the beam under shear and torsion, Calculate the anchorage and development length and check the serviceability requirements for RC structural elements.


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- Design a RC slab and staircase and draw the reinforcement details.
- Design short columns and strip, isolated and combined footings and draw the reinforcement details.

Reference Books: -

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju

Student should prepare the drawing sheets for reinforcement detail of the following-


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CEC-503
Structural Design & Drawing-I (RCC-I)

CEA-503	Structural Design & Drawing-I	0L:0T:2P	1 credits	2Hrs/Week
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1. Reinforcement details of RCC Beam.
2. Reinforcement details of RCC Slab.
3. Reinforcement details of RCC Column.
4. Reinforcement details of footings (Isolated, stepped, combined footing)
5. Reinforcement details of Stair Cases

NOTE:- All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)


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Professional Elective-I

CEA-504(A)

Water Resources & Irrigation Engineering

CEA-504(A)	Water Resources & Irrigation Engineering	3L:1T:0P	4 credits	4Hrs/Week
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Preamble:-

•To introduce the students to the concept of soil-plant characteristics and their water requirements and to understand the necessity of planning an irrigation system to provide water at the right time and right place.

UNIT - I

12Hr

Irrigation water requirement and Soil-Water-Crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

UNIT - II

10Hr

Ground Water and Well irrigation: Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow Conditions, infiltration galleries. Ground water recharge-necessity and methods of improving Ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence causes and effects. Reclamation of water logged and salt affected lands. Types of wells, well Construction, yield tests, specific capacity and specific yield, advantages and disadvantages of well irrigation.

UNIT- III

12Hr

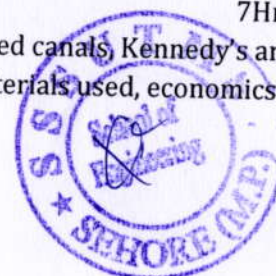
HYDROLOGY : Hydrological cycle, precipitation and its measurement, recording and non-recording rain gauges, estimating missing rainfall data, rain gauge networks, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

UNIT - IV

7Hr

Canals and Structures: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lining-objectives, materials used, economics.


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Introductions to Hydraulic Structures viz. Dams, Spillways, Weirs, Barrages, Canal Regulation Structures.

UNIT- V

7Hr

Floods: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control.

Outcome:-

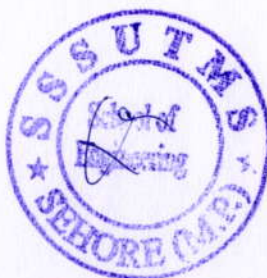
On completion of the course, the student is expected to be able to

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

Reference Books:-

1. Irrigation & Water Power Engineering by Punmia & Pandey B.B.Lal
2. Engineering Hydrology by K. Subramanya - Tata Mc Graw Hills Publ. Co.
3. Engineering Hydrology - J.NEMEC - Prentice Hall
4. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
5. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
6. Engineering Hydrology by H.M. Raghunath


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Professional Elective-I

**CEA-504(B)
Renewable Energy System**

CEA-504 (B)	Renewable Energy System	3L:1T:0P	4 Credits	4Hrs/Week
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Preamble:-

- Understand the various forms of conventional energy resources.
- Learn the present energy scenario and the need for energy conservation.
- Explain the concept of various forms of renewable energy.
- Outline division aspects and utilization of renewable energy sources for both domestic and industrial application.
- Analyse the environmental aspects of renewable energy resources.

UNIT-I

9Hr

Solar Radiation: Extra-terrestrial and terrestrial, radiation measuring instrument, radiation measurement and predictions. Solar thermal conversion: Basics, Flat plate collectors-liquid and air type. Theory of flat plate collectors, selective coating, advanced collectors, Concentrators: optical design of concentrators, solar water heater, solar dryers, solar stills, solar cooling and refrigeration.

UNIT-II

7Hr

Solar photovoltaic: Principle of photovoltaic conversion of solar energy; Technology for fabrication of photovoltaic devices; Applications of solar cells in PV generation systems; Organic PV cells.

UNIT-III

10Hr

Wind energy characteristics and measurement: Metrology of wind speed distribution, wind speed statistics, Weibull, Rayleigh and Normal distribution, Measurement of wind data, Energy estimation of wind regimes. power curve of wind turbine, capacity factor, matching wind turbine with wind regimes; Application of wind energy.

UNIT-IV

12Hr

Production of biomass, Classification of biomass; Physicochemical characteristics of biomass as fuel Biomass conversion routes: biochemical, chemical and thermo chemical Biochemical conversion of biomass to energy: anaerobic digestion, biogas production mechanism, technology, types of digesters, design of biogas plants, installation, operation and maintenance of biogas plants, biogas plant manure-utilization and manure values. Biomass Gasification: Different types, power generation from gasification, cost benefit analysis of power generation by gasification.

UNIT-V

9Hr

Small Hydropower Systems: Overview of micro, mini and small hydro system; hydrology; Elements of turbine; Assessment of hydro power; selection and design criteria of turbines, site selection and

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civil works; speed and voltage regulation; Investment issue load management and tariff collection; Distribution and marketing issues.

Outcome:-

Upon completion of the course, the student will be able to-

- Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
- Know the need of renewable energy resources, historical and latest developments.
- Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc.
- Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
- Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
- Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.

Reference Books:

1. Kothari, Singal & Rajan; Renewable Energy Sources and Emerging Technologies, PHI Learn
2. Khan, B H, NonConventional Energy, TMH.
3. Sukhatme and Nayak, Solar Energy, Principles of Thermal Collection and Storage, TMH.
4. Tiwari and Ghosal, Renewable Energy Resources: basic principle & application


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Open Core Elective - I

**CEC-505(A)
Remote Sensing & GIS**

CEA-505 (A)	Remote Sensing & GIS	3L:1T:0P	4 Credits	4Hrs/Week
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Preamble:-

- To make the students to understand the concepts, components and source of remote sensing.
- To gain knowledge about different types of remote sensing platforms and sensors.
- To explain the concept of satellite image interpretation.
- To understand the applications of remote sensing in Civil Engineering

UNIT

10Hr

Introduction And Concepts- Introduction of Remote Sensing – Energy sources and Radiation principles, Energy equation, EMR and Spectrum, EMR interaction with Atmosphere scattering, Absorption, EMR interaction with earth surface features reflection, absorption, emission and transmission, Spectral response pattern , vegetation, soil, water bodies- Spectral reflectance

UNIT II-

9Hr

Aerial Photography And Photogrammetry- Introduction-,Terrestrial and Aerial photographs - vertical and oblique photographs - height determination contouring - photographic interpretations - stereoscopy – parallax bar- Flight Planning- Photo Interpretation, Applications of aerial Photos-Photo theodolite.

UNIT II

11Hr

Satellite Remote Sensing Principles Data Acquisition –Procedure, Reflectance and Digital numbers- Intensity Reference data , Ground truth, Analog to digital conversion, Detector mechanism- Spectro- radiometer-Ideal remote sensing system – Characters of real and successful remote sensing system- Platforms and sensors- orbits types – Resolution

UNIT IV

12Hr

Remote Sensing Satellites Land observation satellites, characters and applications, IRS series, LANDSAT series, SPOT series, High resolution satellites, character and applications, CARTOSAT series, IKONOS Series, QUICKBIRD series, Weather/Meteorological satellites, INSAT series, NOAA, GOES, NIMBUS Applications, Marine observation satellites OCEANSAT

UNIT V

10Hr

Types Of Remote Sensing And Image Interpretation Introduction- Active, Passive, Optical Remote sensing, visible, infrared, thermal, sensors and characters. Microwave remote sensing Sensors, Concept of Microwave remote sensing, SLAR, SAR Scattro-meters,- Altimeter, Characteristics , Image interpretation characters.


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Outcome:-

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

- Understand the concepts and laws related to remote sensing
- Understand the interaction of electromagnetic radiation with atmosphere and earth material
- Acquire knowledge about satellite orbits and different types of satellites
- Understand the different types of remote sensors
- Gain knowledge about the concepts of interpretation of satellite imagery and civil engineering applications
- Apply various spatial analysis tools for deriving GIS based outcome

Reference Books:-

1. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011. ISBN: 81- 7800-112-8
2. A.M.Chandra and S.K. Gosh. Remote Sensing and GIS, Narosa Publishing Home, New Delhi 2009.
3. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman Remote sensing and image interpretation John Wiley & Sons, 2008
4. George Joseph , Fundamentals of Remote Sensing Universities Press, Hyderabad 2005


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Open Core Elective - I

**CEA-505 (B)
Highway Engineering**

CEA-505 (A)	Highway Engineering	3L:1T:0P	4 Credits	4Hrs/Week
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Preamble:-

To give an overview on the basics of highway engineering and to impart the various process and methods involved in the planning, development, design, construction and maintenance of highways.

UNIT-I

10Hr

HIGHWAY PLANNING AND ALIGNMENT :- History of road development in India – Classification of highways – Institutions for Highway planning, design and construction at different levels – factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT-II

12Hr

GEOMETRIC DESIGN OF HIGHWAYS :- Typical cross sections of Urban and Rural roads -- Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends – Lateral and vertical clearance at underpasses – IRC standards-Road signs and safety. Urban utility services.

UNIT III

8Hr

DESIGN OF FLEXIBLE AND RIGID PAVEMENTS :- Design principles – pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).

UNIT IV

10Hr

HIGHWAY CONSTRUCTION AND MAINTENANCE :- Highway construction materials, properties, testing methods – Construction practice of flexible and concrete pavements including modern materials and methods, Highway drainage – Special considerations for hilly roads; Evaluation and Maintenance of pavements.

UNIT V

8Hr

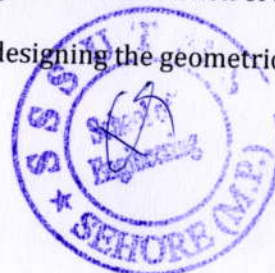
HIGHWAY ECONOMICS AND FINANCE Introduction, Highway User Benefits, Highway Costs, Vehicle Operation Costs, Economic analysis, Highway projects under Public-Private Sector Participation, Bidding process, Highway finance.

Outcome:-

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

- Understand the concepts and standards adopted in Planning, Design and construction of Highways and its related infrastructures.
- Apply the knowledge of science and engineering fundamentals in designing the geometrics for an efficient Highway network and design concepts.

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- Designing various types of pavements to meet specified needs of safety, efficiency and long time sustainability by adopting various design standards.
- Select appropriate methods for construction, evaluation and maintenance of roadways.
- Understand the bidding processes and types of highway projects and analyze the economic, financial aspects of the highway projects

Reference Books:

1. Partha Chakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
2. Kadiyali. L. R. Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 1997.
3. Indian Road Congress (IRC), Guidelines and Special Publications on Planning and Design of Highways.
4. Sharma.S.K Principles , Practices and Design of Highway Engineering, S.Chand and Company Ltd.1995


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Industrial Training-I

CEA-506	Industrial Training-I	0L:0T:4P	2credits	4Hrs/Week
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Preamble:-

1. To expose the students to actual working environment of Civil engineering and enhance their knowledge and skill from what they have learned in the classes.
2. Another purpose of this program is to instill the good qualities of integrity, responsibility and self-confidence.
3. To persue students with the civil engineering field ethics and rules in terms of the society.

Outcome:-

Ability to communicate efficiently. Acquired to be a multi-skilled engineer with good technical knowledge of civil engineering and their processing, management, leadership and entrepreneurship skills. Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

Students must observe following points to enrich their learning in civil engineering during industrial training:

- Industrial environment and work culture.
- Organizational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance & costing.
- Roles and responsibilities of different categories of personnel.
- Problems related to various areas of Work etc.
- Layout if any

To be submitted :The students has to submit the power point presentation of minimum 15 slides of the training performed (comprising of points stated above) along with the original certificate of training performed with proper seal and signature of the authorized person.


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Satya Sai University of Technology & Medical Sciences, Sehore (M.P)
Scheme of Examination
Bachelor of Engineering (Civil Engineering)
VI Semester / III Year Academic Year 2018-19

VI SEMESTER

S. No.	Subject Code	Subject Name	Maximum Marks Theory Slot			Maximum Marks (Practical Slot)		Total Marks	Periods/ hour/ week			Credits
			End Sem. Exam.	Mid Tests	Assignments/ Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz / Presentation		L	T	P	
1	CEA-601	Transportation Engineering-II	60	30	10	30	20	150	2	1	2	4
2	CEA-602	Geotechnical Engineering-I	60	30	10	30	20	150	2	1	2	4
3	CEA-603	Program Elective-II	60	30	10	-	-	100	3	1	0	4
4	CEA-604	Program Elective-III	60	30	10	-	-	100	3	0	0	3
5	CEA-605	Open Core Elective - II	60	30	10	-	-	100	3	0	0	3
6	CEA-606	Minor Project - I	-	-	-	180	120	300	-	-	4	2
TOTAL			300	150	50	240	160	900	13	3	8	20
ELECTIVE SUBJECT												
CEA-603 Program Elective-II		(A) Structural Analysis-II				(B) Ground Water Hydrology						
CEA-604 Program Elective-III		(A) Environmental Engineering-I				(B) Industrial Waste Treatment						
CEA-605 Open Core Elective - II		(A) Structural Design & Drawing - I (STEEL)				(B) Highway Geometric Design						


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VI SEMESTER

CEA-601
Transportation Engineering-II

CEA-601	Transportation Engineering-II	2L:1T:0P	3credits	3Hrs/Week
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Preamble:-

- The Course will try to introduce the basic engineering principles that helps in the planning, design, construction, operation and maintenance of Railways and Airports.

UNIT-I

9Hr

High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location. Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems.

UNIT -II

11Hr

Bituminous & Cement Concrete Payments: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cement concrete pavement design, fatigue and reliability.

UNIT - III

12Hr

Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures. Surface and sub-surface drainage, highway materials: properties and testing etc. Channelized and un-channelized intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

UNIT - IV

8Hr

Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic and their effects on runway alignments, wind-rose diagrams, basic runway length and corrections, classification of airports. Geometrical elements: taxi ways and runways, pattern of runway capacity.

UNIT - V

8Hr

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Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.

Outcome:-

Upon completion of the Transportation Engineering-II course, Students are expected to attain the following outcomes-

- Can handle the design, construction, and operation of railroads and mass transit systems that use a fixed guide way.
- Tasks that include determining horizontal and vertical alignment design, station location and design, and construction cost estimating.
- Will able to design and construct airports.
- Can account for the impacts and demands of aircraft in their design of airport facilities.

Reference Books:

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherly
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Manual by Dr. S. K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker


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CEA-601
Transportation Engineering-II

LIST OF EXPERIMENTS:

CEA-601	Transportation Engineering-II	0L:0T:2P	1credits	2Hrs/Week
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1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall Stability value for Bituminous mix
13. Determination of shape tests on aggregate


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CEA-(602)
Geotechnical Engineering-I

CEA-602	Geotechnical Engineering-I	2L:1T:0P	3credits	3Hrs/Week
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Preamble:-

•To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification. To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils. To impart knowledge of design of both finite and infinite slopes.

UNIT - I

9Hr

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behavior. Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

UNIT - II

11Hr

Soil Water and Consolidation: Soil water, Permeability Determination of permeability in Laboratory and in field. Seepage and seepage pressure. Flow nets, uses of a flow net, Effective, neutral and total stresses. Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of reconsolidation pressure, settlement analysis. Calculation of total settlement.

UNIT - III

10Hr

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. New mark's influence chart. Contact pressure distribution. Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Tri axial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

UNIT - IV

7Hr

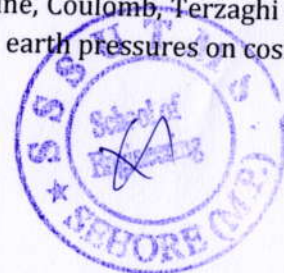
Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

UNIT - V

8Hr

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cosion-


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less and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils. Reinforced earth retaining walls.

Outcome:-

Students will be able to

- Analyze the pin-jointed plane and space frames
- Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
- Analyze the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.
- Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

Reference Books: -

1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Modern Geotech Engg. by Dr.I Aram Singh - IBT Publishers, Delhi.
4. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi
5. Soil Mech. & Found. Engg. by S.K. Garg- Khanna Publishers, Delhi.
6. Soil Testing for Engg. by T.W. Lambe - John Wiley & Soms. Inc.
7. Relevant I.S. Codes



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CEA-(602)
Geotechnical Engineering-I

CEA-602	Geotechnical Engineering-I	0L:0T:2P	1credits	2Hrs/Week
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List of Experiments:

1. Determination of Hygroscopic water content
2. Particle - size analysis
3. Determination of Specific gravity of soil particles
4. Determination of plastic limit
5. Determination of liquid limit
6. Determination of shrinkage limit
7. Permeability tests
8. Direct shear test
9. Consolidation test




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Professional Elective-II

**CEA-603(A)
Structural Analysis-II**

CEA-603 (A)	Structural Analysis-II	3L:1T:0P	4 credits	4 Hrs/Week
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Preamble:-

•To introduce the students to the basic theory and concepts of classical methods of structural analysis.

UNIT- I 10Hr
Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

UNIT- II 8Hr
Plastic analysis of beams and frames.

UNIT-III 10Hr
Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

UNIT-IV 10Hr
Matrix method of structural analysis: force method and displacement method.

UNIT -V 10Hr
Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Outcome:-

Students will be able to

- Analyze the pin-jointed plane and space frames
- Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
- Analyze the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.
- Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

Reference Books:-

1. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
2. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.


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3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
4. Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
5. Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi


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Professional Elective-II

**CEA-603(B)
Ground Water Hydrology**

CEA-603 (B)	Ground Water Hydrology	3L:1T:0P	4credits	4 Hrs/Week
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Preamble:-

- To study occurrence movement and distribution of water that is a prime resource for development of a civilization.
- To know diverse methods of collecting the hydrological information, which is essential, to understand surface and ground water hydrology.
- To know the basic principles and movement of ground water and properties of ground water flow.

UNIT-I

7Hr

Introduction: Ground water utilization & historical background, ground water in hydrologic cycle, ground water budget, ground water level fluctuations & environmental influence, literature/ data/ internet resources.

UNIT-II

10Hr

Occurrence And Movement Of Ground Water: Origin & age of ground water, rock properties affecting groundwater, groundwater column, zones of aeration & saturation, aquifers and their characteristics/classification, groundwater basins & springs, Darcy's Law, permeability & its determination, Dupuit assumptions, heterogeneity & anisotropy, Ground water flow rates & flow directions, general flow equations through porous media.

UNIT-III

10Hr

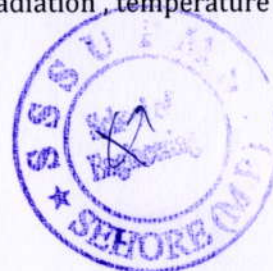
Pollution And Quality Analysis Of Ground Water: Municipal ,industrial ,agricultural ,miscellaneous sources & causes of pollution, attenuation, underground distribution, potential evaluation of pollution, physical ,chemical ,biological analysis of ground water quality, criteria & measures of ground water quality, ground water salinity & samples, graphical representations of ground water quality.

UNIT-IV

9Hr

Surface & Sub-Surface Investigation Of Ground Water: Geological ,geophysical exploration, remote sensing , electric resistivity ,seismic refraction based methods for surface investigation of ground water, test drilling & ground water level measurement, sub-surface ground water investigation through geophysical , resistivity ,spontaneous potential ,radiation , temperature ,caliper , fluid conductivity , fluid velocity ,miscellaneous logging.


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UNIT-V

9Hr

Artificial Ground Water Recharge: Concept & methods of artificial ground water recharge, recharge mounds & induced recharge, wastewater recharge for reuse, water spreading.

Outcome:-

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

- Provide a background in the theory of hydrological processes and their measurement
- Apply science and engineering fundamentals to solve current problems and to anticipate, mitigate and prevent future problems in the area of water resources management
- A systematic understanding of the nature of hydrological stores and fluxes and a critical awareness of the methods used to measure, analyze and forecast their variability; and the appropriate contexts for their application.

REFERENCE BOOKS: -

1. D.K. Todd and L. F. Mays, "Groundwater Hydrology", John Wiley and sons.
2. K. R.Karant, "Hydrogeology", TataMcGraw Hill Publishing Company.
3. S. Ramakrishnan, "Ground water", S. Ramakrishnan.


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Professional Elective-III

**CEA-604 (A)
Environmental Engg.-I**

CEA-604 (A)	Environmental Engg.-I	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

- To prepare students for the effective use of the conventional techniques and engineering analytical methods for design and operation of water and wastewater treatment engineering systems.
- To present the foundations of many basic Engineering tools and concepts related Environmental Engineering.

UNIT - I

8Hr

Estimation of ground and surface water resources. quality of water from different sources, Demand & quantity of water, fire demand, water requirement for various uses, fluctuations in Demand, forecast of population.

UNIT - II

9Hr

Impurities of water and their significance, water-borne diseases, physical, chemical and Bacteriological analysis of water, water standards for different uses. Intake structure, Conveyance of water, pipe materials, pumps - operation & pumping stations.

UNIT - III

10Hr

Water Treatment methods-theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

UNIT - IV

11Hr

Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

UNIT - V

11Hr

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.


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Outcome:-

The students after completing this course will be able to

- Design and draw various units of municipal water treatment plants and sewage treatment plants.
- Recognize the design philosophy of water and wastewater treatment processes.
- The students will learn to understand the theoretical and practical aspects of environmental engineering along with the design and management applications.

Reference Books:-

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
3. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi
4. Environmental Engineering - H.S. Peavy & D.R.Rowe-Mc Graw Hill Book Company,New Delhi
5. Water Supply & Sanitary Engg. by S.K. Husain
6. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
7. Relevant IS Codes


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Professional Elective-III

**CEA-604(B)
Industrial Waste Treatment**

CEA-604 (B)	Industrial Waste Treatment	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

•To provide knowledge on sources and characteristics of Industrial Wastewaters, Techniques and approaches for minimizing the generation of wastewaters at the source and application of physico-chemical, biological and advanced treatment methods for recovery, reuse and disposal of wastewaters in Indian Industries.

UNIT – I

12Hr

Introduction:- Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT - II

8Hr

Cleaner Production:- Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT – III

10Hr

Pollution From Major Industries:- Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT - IV

8Hr

Treatment Technologies:- Equalization – Neutralization – Removal of suspended and dissolved organic solids – Chemical oxidation – Adsorption – Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal

UNIT - V

7Hr

Hazardous Waste Management:- Hazardous wastes – Physico chemical treatment – solidification – incineration – Secure land fills

Outcome:-

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

- Explain the source and types of industrial wastewater and their environmental impacts and choose the regulatory laws pertaining to environmental protection
- Apply knowledge and skills to design industrial wastewater treatment schemes
- Design facilities for the processing and reclamation of industrial wastewater


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- Plan and develop sludge management scheme for sludge generated from industries
- Conduct research to develop effective management systems for industrial wastewater that are technically sound, economically feasible and socially acceptable.

Reference Books:

- (i) Rao M. N. & Dutta A. K. , "Wastewater Treatment", Oxford – IBH Publication, 1995.
- (ii) Eckenfelder W.W. Jr., "Industrial Water Pollution Control", McGraw Hill Book Company, New Delhi, 2000.
- (iii) Patwardhan. A.D., "Industrial Wastewater Treatment", Prentice Hall of India, New Delhi 2010.


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Open Core Elective - II

**CEA-605(A)
Structural Design & Drawing - I (STEEL)**

CEA-605(A)	Structural Design & Drawing - I (STEEL)	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

•To study the behaviour of members and connections, analysis and design of Industrial buildings and to study the design of with cold formed steel and plastic analysis of structures.

UNIT - I 8Hr
Various loads and mechanism of the load transfer, partial load factors, structural properties of Steel, Design of structural connections - Bolted, Riveted and Welded connections.

UNIT - II 9Hr
Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.

UNIT- III 9Hr
Design of simple beams, Built-up beams, Plate girders and gantry girders.

UNIT - IV 10Hr
Effective length of columns, Design of columns-simple and compound, Lacings & battens. Design of footings for steel structures, Grillage foundation.

UNIT - V 12Hr
Design of Industrial building frames, multistory frames, Bracings for high rise structures, Design of transmission towers. NOTE: - All the designs for strength and serviceability should strictly be as per the latest version Of IS:800.

Outcome:-

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

- Design the steel members such as purlins, gable wind girders, base plates subjected to combined forces
- Explain and design the different types of steel connections such as welded, bolted and moment resisting connections
- Analyse and design the industrial structures such as trusses, portal frames subjected to seismic forces.


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- Explain the effect of axial force and shear force on steel structures and analyse the continuous beams, frames using plastic theory
- Evaluate the behaviour and design of compression and flexural members

Reference Books :-

- i) Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
- ii) Design of steel structures by P. Dayaratnam
- iii) Design of steel structures Vol. I & II by Ramchandra
- iv) Design of steel structures by L.S. Negi
- v) Design of steel structures by Ramammutham
- vi) Design of steel structures by Punmia


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Open Core Elective-II

**CEA-605(B)
Highway Geometric Design**

CEA-605(B)	Highway Geometric Design	3L:0T:0P	3credits	3Hrs/Week
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Preamble:-

•To give an overview on the basics of highway engineering and to impart the various process and methods involved in the planning, development, design, construction and maintenance of highways.

UNIT-I

9Hr

Introduction: Geometric Control factors like Topography –design speed – design vehicle – Traffic – Capacity – volume – environment and other factors as per IRC and AASHTO standards and specifications- PCU concept – factors controlling PCU for different design purpose

UNIT-II

10Hr

Cross Sectional Elements: Pavement surface characteristics –friction – skid resistance – pavement unevenness- light reflecting characteristics – camber – objectives – types of camber – methods of providing cambers in the field – problems – carriage way – kerb – median –shoulder – foot path – parking lanes – service roads – cycle tracks –Driveways – Right of way – Factors influencing right of way – Design of Road humps as per latest I RC provisions

UNIT-III

8Hr

Sight Distance Important, types, Side distance at uncontrolled intersection, derivation, factors affecting side distance, IRC, AASHTO standards, problems on above.

UNIT-IV

13Hr

Horizontal Alignment Definition, Checking the stability of vehicle, while moving on horizontal curve, Super elevation, Ruling minimum and maximum radius, Assumptions – problems – method of providing super elevation for different curves – Extra widening of pavement on curves –objectives – Mechanical widening – psychological widening – Transition curve – objectives – Ideal requirements – Types of transition curve – Method of evaluating length of transition curve – Setting the transition curve in the field, set back distance on horizontal curve and problems on above

UNIT-V

12Hr

Vertical Alignment Gradient – Types of gradient – Design criteria of summit and valley curve – Design of vertical curves based on SSD – OSD– Night visibility considerations – Design standards for hilly roads –problems on the above. Principle – At grade and Grade separated junctions – Types – channelization – Features of channelizing Island –median opening – Gap in median at junction.

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Outcome:-

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

- Understand the concepts and standards adopted in Planning, Design and construction of Highways and its related infrastructures.
- Apply the knowledge of science and engineering fundamentals in designing the geometrics for an efficient Highway network and design concepts.
- Designing various types of pavements to meet specified needs of safety, efficiency and long time sustainability by adopting various design standards.
- Select appropriate methods for construction, evaluation and maintenance of roadways.
- Understand the bidding processes and types of highway projects and analyze the economic, financial aspects of the highway projects.

REFERENCE BOOKS:-

1. Khanna, S.K. & Justo, C.E.G., Highway Engineering, NemChand & Bros, Roorkee (U.A).
2. Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi.
3. Kadiyali, L.R. & Lal, N.B., Principles & Practices of Highway Engineering, Khanna Publishers, New Delhi.
4. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand & Co., New Delhi.
5. IRC - 37 "Guidelines for Design of flexible Pavements", IRC, New Delhi, 2001.
6. IRC - 67 "Code of Practice for Road Signs", IRC, New Delhi - 2001. 30
7. IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December, 2002.
8. IRC:70, 1977: "Guidelines on Regulation and Control of Mixed Traffic in Urban Areas"
9. IRC:106, 1990: "Guidelines for Capacity of Urban Roads in Plain Areas"


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CEA 606
Projects-I (Minor)

CEA 606	Project-I (Minor)	0L:0T:4P	2 credits	4Hrs/Week
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GUIDELINES:

1. The Minor-project is a team activity having 3-4 students in a team. This is based on civil engineering construction works.
2. The Minor project may be a complete hardware or a combination of hardware and software. The software part in Minor project should be less than 50% of the total work.
3. Minor Project should cater to a small system required in laboratory or real life.
4. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and Preambles of Minor project.
5. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
6. The student is expected to exert on design, development and testing of the proposed work as per the schedule.


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SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
Scheme of Examination - AICTE Pattern
Undergraduate Degree Courses in Engineering & Technology
Bachelor of Engineering (Civil Engineering)

VII SEMESTER

S.No	Subject Code	Subject Name	Maximum Marks Theory Slot				Maximum Marks (Practical Slot)			Periods/ hour/ week			Credits
			End Sem. Exam	Mid Tests	Assignments/ Quiz	End Sem. Practical & Viva	Practical Record /Assignment/ Quiz/ Presentation	Total Marks	L	T	P		
1	CEA-701	Quantity Surveying & Costing	60	30	10	30	20	150	3	0	2	4	
2	CEA-702	Environmental Engineering-II	60	30	10	30	20	150	3	0	2	4	
3	CEA-703	Program Elective-IV	60	30	10	-	-	100	3	0	0	3	
4	CEA-704	Open Core Elective-III	60	30	10	-	-	100	3	0	0	3	
5	CEA-705	Project Stage-I	-	-	-	120	80	200	-	-	10	5	
6	CEA-706	Self Study/GD/Seminar	-	-	-	-	200	200	-	-	2	1	
TOTAL			240	120	40	180	320	900	12	0	16	20	

Program Elective-IV

- (A) Structural Design & Drawing-I (RCC-II)
 (B) Design of Hydraulic Structures

Open Core Elective-III

- (A) Traffic Engineering
 (B) Construction Planning & Management



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VII SEMESTER

CEA-701
Quantity Surveying & Costing

CEA-701	Quantity Surveying & Costing	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

- The course objective is introducing the student to the fundamental of quantity surveying, cost estimating and specifications.
- To impart knowledge in estimation, tender practices, contract procedures, and valuation of Civil Engineering works.

UNIT - I

9Hr

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

UNIT - II

8Hr

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

UNIT - III

8Hr

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as watersupply, drainage and electrification.

UNIT - IV

8Hr

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

UNIT - V

9Hr

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

Outcome:-

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

- Explain the basic concept of quantity estimation for building, roads, canals and hydraulic structures by manual and software packages.
- Acquire the knowledge to calculate rate analysis and man-hours required for the common civil works by manual and software packages.
- Develop the specification for the materials used in construction, online and offline tender procedures and tender document preparation and report preparation.
- Acquire the knowledge of construction contracts and contract document preparation.

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•Identify the valuation for building, land and plant and machineries, calculation of rent, mortgage and lease.

Reference Books:

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala




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CEA-701
Quantity Surveying & Costing

CEA-701	Quantity Surveying & Costing	0L:0T:1P	1 credits	2Hrs/Week
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Practical Works:

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.




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CEA- 702
Environmental Engineering-II

CEA-702	Environmental Engineering-II	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

- To prepare students for the effective use of the conventional techniques and engineering analytical methods for design and operation of sewerage systems.
- To present the foundations of many basic Engineering tools and concepts related Environmental Engineering.

UNIT - I

8Hr

Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

UNIT -II

10Hr

Characteristics and analysis of waste water, rcycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.

UNIT -III

9Hr

Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

UNIT - IV

10Hr

Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

UNIT -V

12Hr

Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods.

Rural sanitation - collection & disposal of refuse, sullage & night soil Laboratory work shall be based on the topics of environmental engineering I & II and consist of experiments of water and waste water quality as per facility available in the institution.

Outcome:-

The students after completing this course will be able to

- Design and draw various units of sewage treatment plants.
- Recognize the design philosophy of water and wastewater treatment processes.

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- The students will learn to understand the theoretical and practical aspects of environmental engineering along with the design and management applications.
- The students will learn to understand the methods of biological treatment and its design.

Reference Books :-

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
3. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
4. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
6. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi




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CEA- 702
Environmental Engineering-II

CEA-702	Environmental Engineering-II	0L:0T:1P	1 credits	2Hrs/Week
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List of Experiment:-

1. To study the various standards for waste water
2. To study the sampling techniques for waste water
3. To determine the alkalinity in water sample
4. To determine the acidity in water sample
5. Determination of Dissolved Oxygen in the water and waste water sample
6. Determination of Biological Oxygen demand of a waste water sample
7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method


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Professional Elective-IV

**CEA- 703 (A)
Advanced Structural Design (RCC)-II**

CEA-703 (A)	Advanced Structural Design (RCC)-II	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

•To impart knowledge on basic of concepts of design of reinforced concrete structures and to make the students able to design and detail the elements like sway non-sway building, shear wall, retaining wall, water tanks, silo, bunker and T-beam, slab bridges.

UNIT - I

10Hr

Design of Multistory Buildings - Sway and Non-sway buildings, Shear walls and other bracing elements.

UNIT II

8Hr

Earth Retaining Structures: Cantilever and counter fort types retaining walls.

UNIT - III

10Hr

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

UNIT - IV

10Hr

Silos and Bunkers

UNIT - V

10Hr

T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

Outcome:-At the end of the course the student will be able to

- Explain various design concepts and design building under sway and non-sway condition.
- Design earth retaining structure.
- Design water tank and draw the reinforcement details.
- Design of silo and bunker and design of T-beam & slab bridges.

Reference Books: -

1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.
7. Pre stresses concrete – T.Y. Lin


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Professional Elective-IV

**CEA-703 (B)
Design of Hydraulic Structures**

CEA-703 (B)	Design of Hydraulic Structures	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

•This course is aimed to develop the understanding of basic principles and concepts of analysis and design of hydraulic structures on permeable foundation such as weirs and barrages, canal falls and various river training works along with the detailed insight in to the theories of sub-surface flow. The course also intends to learn the detailed design principles of canal transitions and regulation works.

UNIT - I

12Hr

Reservoir Planning: Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir. Earth Dams: Types, causes of failure and design criteria, soils suitability for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

UNIT - II

8Hr

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, practical profile, evaluation of profile by method of zoning, foundation treatment, construction joints, galleries in gravity dams.

UNIT - III

11Hr

Spillways: Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways. Design of outlets and rating curves Energy dissipaters: Principles of energy dissipation Energy dissipaters based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles. Design of canal regulating structures, Design of Channel transitions,

UNIT - IV

9Hr

Structures on Pervious formations: Bligh's creep theory, limitations, Khosla's theory of independent variable, Khosla's corrections, Design of Weir and Barrages: design of waterways and crest levels, design of impervious floors and protection works.

UNIT - V

8Hr

Canal Structures and Hydropower Plants: Design of canal falls, Regulators, Cross drainage works, Introduction of Hydropower development, general features of hydro-electric schemes, selection of turbines.

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Outcome:-

Upon successful completion of this course, it is expected that students will be able to-

- Understand the design aspects of various hydraulic structures on permeable foundation and their causes of failure.
- Plan and design the efficient silt control structures and relevant river training works.
- Plan and design suitable transition structures for subcritical and supercritical flow conditions using standard available methods.
- Plan and design of canal regulation works.

REFERENCE BOOKS: -

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey B.B. Lal
5. Water Power Engineering by Dandekar


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Open Core Elective-III

CEA- 704 (A) Traffic Engineering

CEA-704 (A)	Traffic Engineering	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

•To give an overview of Traffic engineering, various surveys to be conducted, traffic Regulation, management and traffic safety.

UNIT -I

8Hr

Traffic Characteristics: (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

UNIT -II

10Hr

Traffic Studies: (i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

UNIT -III

10Hr

Traffic Operations and Control: (i) Traffic regulations and various means of control. (ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

UNIT -IV

9Hr

Street Lighting : (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

UNIT -V

10Hr

Accident Studies & Mass Transportation: (i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.


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Outcome:-

Students who successfully complete this course will be able to-

- Understand the principles and standards adopted in Planning and Design of Traffic system.
- Apply the knowledge of science and engineering fundamentals in conducting traffic surveys and analyze the problems.
- Designing various types of control and regulatory measures to meet an efficient traffic network.
- Select appropriate methods to ensure the safety of the road users and analyze the environmental issues related to traffic network.
- Understand various traffic management measures in addressing the demand, pricing and ITS applications.

REFERENCE BOOKS :-

1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S.Smith & F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R.Drew, Traffic Flow Theory
5. W.R. Mchsne and R.P. Roess "Traffic Engg"
6. Wohl & Martin, Traffic System Analysis for Engineering & Planners


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Open Core Elective-III

**CEA- 704 (B)
Construction Planning & Management**

CEA-704 (B)	Construction Planning & Management	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

•To study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.

UNIT -I

8Hr

Preliminary and detailed investigation methods: Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

UNIT -II

9Hr

Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

UNIT -III

10Hr

Tenders & Contracts: Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

UNIT -IV

10Hr

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

UNIT-V

10Hr

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.


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Outcome:-

•On completion of this course the students will know the development of construction planning, management procedure and different construction equipment, tender & contracts.

Reference Books:-

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai


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CEA-705
Major Project-I

CEA-705	Major Project-I	0L:0T:10P	5 credits	10 Hrs/Week
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Preamble:-

The object of Major project I or dissertation is to enable the student to extend further the investigative study taken up under civil engineering Construction projects, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry.

GUIDELINES:-

1. The Major-project is a team activity having 3-4 students in a team.
2. The Major project may be a complete hardware or a combination of hardware and software. The software part in Minor project should be less than 50% of the total work.
3. Minor Project should cater to a small system required in laboratory or real life.
4. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of Minor project.
5. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
6. The student is expected to exert on design, development and testing of the proposed work as per the schedule.


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CEA-706
Self Study/GD/Seminar

CEA-706	Self-Study/GD/Seminar	0L:0T:2P	1 credits	2Hrs/Week
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Preamble:-

The main objective is to improve the mass communication and convincing/understanding skills of students and to give the students an opportunity to exercise their rights to express themselves. The evaluation will be done based on their presentation work and group discussion.

Presentation Skills

They will be able to make use of visual, audio and audio-visual material to support their presentation, and will be able to speak cogently with or without notes. Students will present either in groups or as individuals.

Discussion Skills

Students will be able to judge when to speak and how much to say, speak clearly and audibly in a manner appropriate to the subject, ask appropriate questions, use evidence to support claims, respond to a range of questions, take part in meaningful discussion

Listening Skills

Students will demonstrate that they have paid close attention to what others say and can respond constructively. Through listening attentively, they will be able to build on discussion fruitfully, supporting and connecting with other discussants. They will be able to follow academic discussions, infer meanings that are not overt, and take notes from a discussion or presentation.

Argumentative Skills and Critical Thinking

Students will develop persuasive speech, present information in a compelling, well-structured, and logical sequence, respond respectfully to opposing ideas, show depth of knowledge of complex subjects, and develop their ability to synthesize, evaluate and reflect on information.

Questioning

Through asking appropriate questions, students will demonstrate their understanding of discussions and spark further discussion.

Interdisciplinary Inquiry

Students will be able to reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem.

Engaging with Big Questions

Students will engage with important questions that stimulate discussion and debate


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Studying Major Works

Students will engage with works that are widely held to be significant in the field of study, while recognizing cultural diversity and the ever-changing nature of what is regarded as important.

Outcome:-

In terms of content, students will be able to


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SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
Scheme of Examination - AICTE Pattern
Undergraduate Degree Courses in Engineering & Technology
Bachelor of Engineering (Civil Engineering)

VIII SEMESTER

S.No	Subject Code	Subject Name	Maximum Marks			Total Marks	Periods/ hour/ week			Credits		
			End Sem. Exam	Mid Tests	Theory Slot		Maximum Marks (Practical Slot)	Practical Record /Assignment/ Quiz / Presentation	L		T	P
1	CEA-801	Geotechnical Engineering-II	60	30	10	30	20	150	3	0	2	4
2	CEA-802	Program Elective-V	60	30	10	-	-	100	3	0	0	3
3	CEA-803	Open Core Elective-IV	60	30	10	-	-	100	3	0	0	3
4	CEA-804	Project Stage-II	-	-	-	240	160	400	-	-	16	8
TOTAL			180	90	30	270	180	750	9	0	18	18

Program Elective-V

CEA-802	(A) Structural Design & Drawing-II (STEEL-II)
	(B) Earthquake Resistant Design of Structures
CEA-803	(A) Pavement Design
	(B) Urban Transportation Planning

Open Core Elective-IV

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VIII SEMESTER

CEA-801

Geotechnical Engineering-II

CEA-801	Geotechnical Engineering-II	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

•To impart knowledge to plan and execute a detail site investigation programme, to select geotechnical design parameters and type of foundations. Also to familiarize the students for the geotechnical design of different type of foundations and other structures.

UNIT - I

10Hr

Shallow Foundations: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

UNIT - II

9Hr

Deep Foundation: Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

UNIT - III

10Hr

Soil Improvement Techniques: Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness. Soil stabilisation: Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilisation and sabilisation by grouting. Geo-synthetics, types, functions, materials and uses.

UNIT - IV

8Hr

Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

UNIT - V

10Hr

Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

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LABORATORY WORK: Laboratory work will be based on the course of Geotech. Engg. I & II as required for soil investigations of engineering projects and not covered in the lab. Work of Geotech. Engg. I

Outcome:-

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

- Graduate will demonstrate an ability to plan and execute a detailed site investigation to select geotechnical design parameters and type of foundation.
- Graduate will demonstrate an ability to design shallow foundations, its component or process as per the needs and specifications.
- Graduate will demonstrate an ability to design combined footings and raft foundations, its component or process as per the needs and specifications.
- Graduate will demonstrate an ability to design deep foundations, its component or process as per the needs and specifications.

REFERENCE BOOKS :-

1. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publications Delhi
3. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4. Geotech. Engg. by C.Venkatramaiah- New AGE International Publishers, Delhi
5. Found. Engg. by GALEonards McGraw Hill Book Co. Inc.
6. Relevant IS Code


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CEA-801

Geotechnical Engineering-II

CEA-801	Geotechnical Engineering-II	0L:0T:2P	1 credits	2Hrs/Week
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LIST OF EXPERIMENTS

30Hr

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration of Plate Load Test SPT & DCPT


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Professional Elective-V

**CEA-802 (A)
Structural Design And Drawing-II (Steel-II)**

CEA-802 (A)	Structural Design And Drawing-II (Steel-II)	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

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

Unit - I

9Hr

Plate girder bridges (Riveted and welded)

Unit - II

11Hr

Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

Unit - III

12Hr

Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

Unit - IV

8Hr

Chimneys: Guyed and self-supporting steel stacks.

Unit - V

9Hr

Bunkers, Silos & Towers

OUTCOME:

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

- Recognize the design philosophy of steel structures and identify the different failure modes of bolted and welded connections, and determine their design strengths
- Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria

PRACTICAL & SESSIONAL WORK:

Laboratory work will be based on the course of STEEL-II as required for The design of engineering projects.


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CEA-802 (B)
Earthquake Resistant Design of Structures

CEA-802 (B)	Earthquake Resistant Design of Structures	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

- Apply seismic coefficient and response spectrum methods for analysis of multi storied buildings.
- Apply concepts of ductility in the design of multi-storeyed structures.
- Analyse a water tank structure based on latest earthquake code.
- Understand the concepts of base isolation

UNIT I

8Hr

Seismic Strengthening of Existing Buildings: Cases Histories-Learning from earthquakes, seismic strengthening procedures.

UNIT II

10Hr

Torsion & Rigidity: Rigid Diaphragms, Torsional moment, Center of mass and center of rigidity torsion effects. Lateral Analysis of Building Systems: Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear wall-frame combination, examples.

UNIT III

11Hr

Concept of Earthquake Resistant Design: Objectives of seismic design, Ductility, Hysteric response & energy dissipation, response modifications factor, design spectrum, capacity design, classification of structural system, IS code provisions for seismic design of structures, multi-storied buildings, design criteria, P-A effects, storey drift, design examples ductile detailing of RCC structures.

UNIT IV

10Hr

Seismic Design of Special Structures: Elevated liquid storage tanks, Hydrodynamic pressure in tanks, stack like structures, IS-1893 code provisions for bridges; Superstructures, substructures, submersible bridges, dams; Hydrodynamic effect due to reservoir, concrete gravity dams.

UNIT V

8Hr

Engineering Seismology: Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients.

Outcome:-

Students who successfully complete this course will be able to-

- Understand the seismic coefficient and response spectrum methods for analysis of multi storied buildings.
- Understand design concepts of ductility in the design of multi-storeyed structures.
- Understand the design of water tank structure based on latest earthquake code.
- Understand the concepts of base isolation.


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Reference Books:

1. Chopra A.K., Dynamics of Structures', Theory & Applications to Earthquake Engineering, Prentice Hall India, New Delhi-1995
2. Clough & Penzien, Dynamics of Structures , McGraw Hill Book CO. Inc.
3. Paz M, Structural Dynamics, Van Nostrand Reinhold, New York
4. Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.
5. IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
6. IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.


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Open Core Elective-IV

**CEA-803 (A)
Pavement Design**

CEA-803(A)	Pavement Design	3L:0T:0P	3 credits	3Hrs/Week
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Preamble:-

- Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements. Further, the student will be in a position to assess quality and evaluate the serviceability conditions of pavements.

UNIT -I

12Hr

Equivalent Single Wheels Load concepts and applications, Relationship between wheel arrangements and loading effects, tyre contact area, Effect of load repetition, Effect of transient loads, Impact of moving loading, Factors to be considered in Design of pavements, Design wheel load, soil, climatic factors, pavement component materials, Environmental factors, Special factors such as frost, Freezing and thawing.

UNIT -II

10Hr

Flexible Pavements : Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

UNIT -III

9Hr

Rigid Pavements: Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions.

UNIT -IV

9Hr

Rigid pavement design : IRC method, Fatigue analysis, PCA chart method. AASHTO Method, Reliability analysis.

PAVEMENT JOINTS: Types of joints, contraction and warping joints, dowel bars and tie bars, Temperature reinforcements, filling and sealing of joints.

UNIT -V

7Hr

Evaluation and Strengthening of Existing Pavements : Benkleman beam method, Serviceability Index Method. Rigid and flexible overlays and their design procedures.

Outcome:-

Upon completion of this course, students will be able to-

- Explain concepts and standards adopted in Planning Design and construction of Pavements.
- Apply the knowledge of science and engineering fundamentals in designing flexible pavement. by adopting various design standards.

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- Apply the standards adopted in designing rigid pavement.
- Select appropriate methods for construction and evaluation of Pavements.
- Address the problem statement in construction of pavement and to impart knowledge in stabilization techniques.

Reference Books:--

1. Principles of pavement design by E.J.Yoder & M.W. Witczak
2. AASHO, "AASHO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidelines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent Way"


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Sri Satya Sai University of Technology and Medical Sciences

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Name of Faculty : **School of Engineering**

Name of Department: **Structure Design**

Minutes of Board of Studies Committee Meeting Dated on **06.06.2017**

The Board of Studies Committee Meeting was held in the room of Department of Civil Engineering at 10.15 AM. on **06.06.2017**, Following members were present.

1. Dr Ajay Swarup Prof.. (Civil Engineering), - Chairman
2. Dr P.K.Agarawal (Civil Engineering) External Member
3. Dr. S.K. Mittal (Civil Engineering), External Member
4. Dr. Jayant Mishra. Prof. (Civil Engineering), Member
5. Mr. Kuldeep Shrivastava Astt.Prof. (Civil Engineering), Member
6. Ms. Nidhi Gupta Asst. Prof. (Civil Engineering), Member
7. Ms.Sana Khan Astt.Prof. (Civil Engineering) Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved. The internal member of the committee suggested that the scheme and syllabus should be prepared as per current demand in the academics. The external member (Academic Expert) suggested for

- 1) Advance Foundation Engineering
 - 2) Design of Offshore Structures
- be added as an elective.

Resolution of the discussion

On the basis of discussion the following amendments were made. Scheme and syllabus were made. Scheme and syllabus was prepared as per current demand in the academics. The

- 1) Advance Foundation Engineering
- 2) Design of Offshore Structures

has been added as an elective Subject. Committee welcomes a

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& Medical Sciences Sehore (M.P.)



The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr Ajay Swarup Prof.. (Civil Engineering), - Chairman
2. Dr P.K.Agarawal (Civil Engineering) External Member
3. Dr. S.K. Mittal (Civil Engineering), External Member
4. Dr. Jayant Mishra. Prof. (Civil Engineering), Member
5. Mr. Kuldeep Shrivastava Astd.Prof. (Civil Engineering), Member
6. Ms. Nidhi Gupta Asst. Prof. (Civil Engineering), Member
7. Ms.Sana Khan Astd.Prof. (Civil Engineering) Member

Ajay Swarup
S.K. Mittal

Jayant Mishra

Kuldeep

Nidhi Gupta

Sana Khan

Ajay Swarup
Chairman *cor. Ajay Swarup*



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Scheme of Examination

Third Semester –Master of Technology(Structural Design)

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments/Quiz	End Sem. Practical / Viva	Practical Record/assignment/Quiz/Presentation	
1.	MTSD-301	Elective I	3	1	-	4	70	20	10	-	-	100
2.	MTSD-302	Elective II	3	1	-	4	70	20	10	-	-	100
3.	MTSD-303	Seminar	-	-	4	4	-	-	-	-	100	100
4.	MTSD-304	Dissertation part-I (Literature Review/problem formulation/Synopsis)			8	8	-	-	-	120	80	200
Total			6	2	12	20	140	40	20	120	180	500

L: Lecture- T: Tutorial- P: Practical

w.e.f. July- 2014

Elective-I (MTSD-301)

- A) Advanced Foundation Engineering
- B) Design of Earth Quake Resistant Structures
- C) Design & Analysis of Steel Structures
- D) Building Structure & Construction Management

Elective –II (MTSD-302)

- A) Design of Offshore Structures
- B) Fracture Mechanism
- C) Low cost Housing Techniques
- D) Design of Bridges



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MTSD 301(A) Advanced Foundation Engineering

UNIT 1

Soil Exploration: Introduction, Methods of exploration, Direct Methods and techniques of exploration, Methods of boring types of samples, Disturbance of soil sample, Soil samplers and sampling techniques, Ground water observations, Boring records, Spacing and depth of bore holes, Indirect methods of soil exploration, Penetration tests, Geophysical methods, Dynamics methods, Sequence of exploration programs

UNIT 2

Shallow Foundations: Introduction, General Requirements, Depth of foundation, Bearing capacity, Eccentric Inclined loads, Bearing capacity of stratified soils, Settlement of footings, Settlement of footings from constitutive laws, Settlement and tilt of eccentrically loaded footings, Allowable settlement, Plate bearing test, Standard penetration test Effect of water table, shallow foundation classification, Modulus of sub-grade reaction, Beams on elastic foundation, Raft foundation.

UNIT 3

Pile Foundation: Introduction, Uses of piles, Types of piles, pile drivers, Bearing capacity of piles, Static analysis, Pile load test, Dynamic methods, Other methods, 24 Negative skin friction, Pile group, Ultimate bearing capacity of pile groups, Settlement of pile group, Influence of pile cap. Laterally loaded piles, Ultimate resistance, Elastic methods, Pile groups under lateral load, batter pile under lateral load, Batter pile groups under inclined loads, pile under dynamic loads.

UNIT 4

Coffer Dams: Introduction, types of Coffor Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, Interlock stresses. Foundations in black cotton soils basic foundation problems associated with black cotton soils. Lime column techniques principles and execution. Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

UNIT 5

Machine Foundations : Introduction, Criteria for satisfactory action of a machine foundation, Definitions, Degrees of freedom of a block foundation, Analysis of block foundation, Theory of linear weightless spring, Equivalent soil springs, Vertical vibration, Rocking vibration, Vibration in shear, Simultaneous rocking sliding and vertical vibrations for a foundation, Indian standard on design and construction of foundations for reciprocating machines, Foundations for impact type machines, Indian Standard on design and construction of foundations for impact type machines, Analysis of block foundation based on elastic half space theory.

References Books:

1. Bowles, Foundation: Analysis and Design, McGraw Hill Book CO. Inc.
2. Peck , R.B. , W.E. Hanson and T.H. Thornburn, Foundation Engineering, Wiley , New York
3. Foundation Design and Construction-Tomlinson • Foundation Design-Teng.
4. Geotechnical Engg – C.Venkatramaiah
5. Foundation Engineering by Brije.M.Das, Printice Hall Publishers.


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MTSD-301 (B) Design of Earth quake Resistant Structures

UNIT 1

Seismic Strengthening of Existing Buildings: Cases histories-Learning from earthquakes, seismic strengthening procedures. Selection of materials and types of construction form of superstructure – framing systems and seismic units – devices for reducing. Earthquake loads,

UNIT 2

Torsion & Rigidity: Rigid Diaphragms, Torsional moment, Center of mass and center of rigidity torsion effects. Lateral Analysis of Building Systems: Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear wall-frame combination, examples.

UNIT 3

Concept of Earthquake Resistant Design: Objectives of seismic design , Ductility, Hysteric response & energy dissipation, response modifications factor, design spectrum, capacity design, classification of structural system, IS code provisions for seismic design of structures, multi-storied buildings, design criteria, P-A effects, storey drift, design examples ductile detailing of RCC structures.

UNIT 4

Seismic Design of Special Structures: Elevated liquid storage tanks, Hydrodynamic pressure in tanks, stack like structures, IS-1893 code provisions for bridges; Superstructures, substructures, submersible bridges, dams; Hydrodynamic effect due to reservoir, concrete gravity dams.

UNIT 5

Engineering Seismology: Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients.Characteristics of Wind and Earthquake forces and its method of analysis.

Reference Books:

1. Chopra A.K., Dynamics of Structures', Theory & Applications to Earthquake Engineering , Prentice Hall India, New Delhi-1995
2. Clough & Penzien, Dynamics of Structures , McGraw Hill Book CO. Inc.
3. Paz M, Structural Dynamics, , Van Nostrand Reinhold, New York
4. Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.
5. IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
6. IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.




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MTSD -301 (C) Design & Analysis of steel Structures

UNIT 1

Matrix Method Analysis: Flexibility and stiffness matrices-Force displacement relationships for axial force, couple, torsional moments – stiffness method of analysis and flexibility method of analysis. Equation Solvers: Solution of system of linear algebraic equations-direct inversion method-gauss elimination method-Cholesky method-banded equation solvers frontal solution technique

UNIT 2

Columns: Basic concepts, strength curve for an ideal strut, strength of column members in practice effect of eccentricity of applied loading. Effect of residual stresses, concept of effective lengths, no sway columns, torsional and torsion flexural buckling of columns, Robertson's design curve, modification to Robertson approach, design of columns using Robertson approach.

UNIT 3

Laterally Restrained Beams: Flexural & shear behavior, web buckling & web crippling, effect of local buckling in laterally restrained plastic or 'compact' beams, combined bending & shear, unsymmetrical bending. Unrestrained Beams: Similarity of column buckling of beams, lateral torsional buckling of symmetric section, factors affecting lateral stability, buckling of real beams, design of cantilever beams, continuous beams.

UNIT 4

Beams Columns: Short & long beam columns, effects of slenderness ratio and axial force on modes of failure, beam column under biaxial bending, strength of beam columns, local section failure & overall member failure.

UNIT 5

Beams Subjected to Torsion and Bending: Introduction, pure torsion and warping, combined bending torsion, capacity check, buckling check, design methods for lateral torsional buckling.

Reference Books:

1. Morsis L.J. Plum, D.R., Structural Steel Work Design
2. Sinha D.A., Design of Steel Structures
3. Yu, W.W., Cold Formed Steel Structures Design
4. John L.Meek., Matrix Structural Analysis, McGraw Hill Book company.
5. Structural Analysis by Pundit & Gupta
6. Structural Analysis by C.S.Reddy.
7. Structural Analysis – R.C.Hibbeler




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MTSD-301 (D) Building Structure & Construction Management

UNIT-1

Types constructions-public and private contract managements – scrutinizing tenders and acceptance of tenders, contracted, changes and terminating of contract – subcontracts construction organizations – organizational chart-Decentralization payrolls and records – organization chart of a construction company.

UNIT-2

Construction Practices and Resource Management– Time Management – bar chart, CPM, PERT – Progress report, Basic concepts equipment management, material management inventory control.

UNIT-3

Accounts Management – Basic concepts, Accounting system and book keeping, depreciation, Balance sheet, profit and loss account, internal auditing. Quality control by statistical methods, sampling plan and control charts, safety requirements.

UNIT-4

Cost and Financial Management – Cost volume relationship, cost control system, budget concept of valuation, cost of equity capital management cash. Labor and industrial; laws – payment of wages act. Contract labor, workmen" s compensation, insurance, industrial disputes act.

UNIT-5

Behavior of tall structures under static and dynamic loads, model analysis. Shear walls, Frame Structures, Coupled shear walls, Tabular Structures, Ductility and reinforcement details at joint. Design Criteria and Modeling of tall structures, case studies.

Reference Books:

1. Coull, Smith, Design of tall buildings
2. Taranath, Design of tall buildings
3. Construction Management and planning by B.Sengupata and H.Gula(Tata McGraw Hill)
4. Construction Management by Atkinson(Elsevier)
5. in principle land practice by EEC beech(Longman)
6. Robert Schultheis, Mary Summer "management information systems-The Management View."TATA Mc Graw Hill Edition, New Delhi.
7. Kwakye, A.A , Construction Project Administration Addison Wesley Longman, London.
8. Keith Davis, Human Behavior at Work, Mc Graw Hill, USA.
9. Sehroeder, R.G., Operations Management, Mc Graw Hill, USA.
10. James C.Van Horne, Financial Management and Policy, Prentice Hall of India Pvt.Ltd., 4th Ed., NewDelhi.



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MTSD-302 (A) Design of Offshore Structures

UNIT-1

Loads and structural forms of different types of offshore structures; Elements of single d.o.f. system subjected to free and forced vibration.

UNIT-2

Analysis for transient and steady state force; Equivalent damping for nonlinear systems; Dynamics of multi d.o.f. systems; Eigen values and vectors; Iterative and transformation methods.

UNIT-3

Mode superposition. Fourier series and spectral method for response of single d.o.f. systems; Vibrations of bars, beams and cones with reference to soil as half space.

UNIT-4

Behavior of concrete gravity platform as a rigid body on soil as a continuum; short and long term statistics of wind;

UNIT-5

Static wind load; Effect of size, shape and frequency; Aerodynamic admittance function and gust factor, spectral response due to wind for various types of structures; Wave loads by Morison's equation; Static and dynamic analysis of fixed structures; Use of approximate methods.

Reference Books:

1. Brebbia C.A. Walker, Dynamic Analysis of Offshore Str., Newnes Butterworth
2. Sarpakaya T and Isaacson M., Mechanics of wave forces on offshore structures, Van Nostrand Reinhold New York,
3. Hallam M.G. Heaf N.J. and Wootton, L.R., Dynamics of Marine Structures, CIRIA Publications Underwater Engg., Group, London
4. Graff W.J., Introduction to offshore Structures, Gulf Publishing Co., Houston, Texas
5. Clough R.W. and Penzine J., Dynamic of Structures - II Ed., McGraw Hill Book CO.
6. Simiu E. and Scanlan R.H., Wind Effects on Structures, Wiley, New York 1978
7. Codes of Practice (latest versions), Such as API RP-2A, Bureau Veritas etc.
8. Proceedings of Offshore Technology Conference (OTC) Behavior of Offshore Structures (BOSS) and other Conferences on offshore Engineering



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MTSD – 302(B) Fracture Mechanism

UNIT 1

Summary of Basic Problems and Concepts: Introduction - A crack in a structure - The stress at a crack tip - The Griffith criterion The crack opening displacement criterion - Crack Propagation - Closure.

The Elastic Crack-Tip Stress Field : The Airy stress function - Complex stress functions - Solution to crack problems - The effect of finite size - Special cases - Elliptical cracks - Some useful expressions

UNIT 2

The Crack Tip Plastic Zone: The Irwin plastic zone correction - The Dugdale approach - The shape of the plastic zone - Plane stress versus plane strain - Plastic constraint factor - The thickness effect.

The Energy Principle: The energy release rate - The criterion for crack growth - The crack resistance (R curve) - Compliance , The J integral (Definitions only)

UNIT 3

Plane Strain Fracture Toughness: The standard test - Size requirements - Non-Linearity - Applicability

Plane Stress and Transitional Behaviour: Introduction - An engineering concept of plane stress - The R curve concept

UNIT 4

The Crack Opening Displacement Criterion: Fracture beyond general yield - The crack tip opening displacement - The possible use of the CTOD criterion

UNIT 5

Determination of Stress Intensity Factors: Introduction - Analytical and numerical methods - Finite element methods, Experimental methods (Definitions only)

Reference Books:

1. Elementary engineering fracture mechanics - David Broek, Battelle, columbus laboratories, columbus, Ohio, USA
2. Fracture and Fatigue Control in Structures - John M. Barsom, Senior consultant United States Steel Corporation & Stanley T. Rolfe, Ross H. Forney Professor of Engineering University of Kansas. & Stanley T. Rolfe, Ross H. Forney Professor of Engineering, University of Kansas .



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MTSD-302 (C) Low cost Housing Techniques

UNIT 1

Housing Scenario :Introduction - Status of urban housing - Status of Rural Housing. Introduction to - Existing finance system in India - Government role as facilitator - Status of Rural Housing Finance - Impediments in housing finance and related issues .

Land Use and Physical Planning for Housing: Introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye laws - Residential Densities

UNIT 2

Housing the Urban Poor: Introduction - Living conditions in slums - Approaches and strategies for housing urban poor .

Development and Adoption of Low cost Houing: Introduction - Adoption of innovative cost-effective construction techniques - Adoption of precast elements in partial prefatroides - Adopting of total prefactcation of mass housing in India- General remarks on pre cast roofing/flooring systems - Economical wall system - Single Brick thick load bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall - Flyash gypsym brick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT 3

Alternative Building Materials for Low cost Housing: Introduction - Substitute for scarce materials – Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Alternative building maintenance

UNIT 4

Low Cost Infrastructure Services: Introduction to - Present status - Technological options - Low cost sanitation - Domesfic wall - Water supply, energy

Rural Housing: Introduction to traditional practice of rural housing-continuous Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT 5

Housing in Disaster Prone Areas: Introduction – Earthquake - Damage to houses - Disaster prone areas - Type of Damages and Repairs of non-engineered buildings - Repair and restoration of earthquake Damaged non-engineered buildings recommendations for future constructions Requirement” s of structural safety of thin precast roofing units against Earthquake forces Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety.



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Reference Books:

1. Building materials for low – income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of concrete – Neville A.M. Pitman Publishing Limited, London.
4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences.
5. Low cost Housing – G.C. Mathur.
6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

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2. Hand book of low cost housing by A.K.Lal – Newage international publishers.

3. Properties of concrete – Neville A.M. Pitman Publishing Limited, London.

4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences.

5. Low cost Housing – G.C. Mathur.

6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

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MTSD-302(D) Design Of Bridges

UNIT 1

Introduction : Classification, investigations and planning, choice of type – economic span length – IRC specifications for road bridges, standard live loads, other forces acting on bridges, general design considerations.

UNIT 2

Design of Box Culverts : General aspects – Design loads – Design moments, shears and thrusts – Design of critical section.

Design of Slab Bridges: Effective width of analysis – working stress design and detailing of slab bridges for IRC loading.

UNIT 3

T-BEAM Bridges: Introduction – wheel load analysis – B.M. in slab – Pigaud's theory – analysis of longitudinal girders by Courbon's theory working stress design and detailing of reinforced concrete T-beam bridges for IRC loading.

Prestressed Concrete Bridges: General features – Advantages of Prestressed concrete bridges – pretensioned Prestressed concrete bridges – post tensioned Prestressed concrete Bridge decks. Design of post tensioned Prestressed concrete slab bridge deck.

UNIT 4

Bridge Bearings : General features – Types of bearings – forces on bearings basis for selection of bearings – Design principles of steel rocker and roller bearings and its design – Design of elastometric pad bearing detailing of elastometric pot bearings.

Piers and Abutments: General features – Bed block – Materials for piers and abutments – types of piers – forces acting on piers – Design of pier – stability analysis of piers – general features of abutments – forces acting on abutments – stability analysis of abutments.

UNIT 5

Bridge Foundations: General Aspects – Types of foundations – Pile foundations – well foundations – caisson foundations.



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Reference Books:

1. Essentials of bridges engineering – D.Hohnson Victor oxford & IBH publishers co-Private Ltd.
2. Design of concrete bridges MC aswanin VN Vazrani, MM Ratwani, Khanna publishers.
3. Bridge Engineering – S.Ponnuswamy.
4. BRowe, R.E., Concrete Bridge Design, C.R.Books Ltd., London.
5. Taylor F.W., Thomson, S.E., and Smulski E., Reinforced concrete Bridges, John wiley and sons, New york.
6. Derrick Beckett, an Introduction to Structural Design of concrete bridges, surrey University; press, Henlely – thomes, oxford shire.
7. Bakht.B.and Jaegar, L.G. bridge Analysis simplified, Mc Graw Hill.
8. Design of Bridges – N.Krishna Raju – Oxford & IBH
9. Design of Bridge structures – FR Jagadeesh, M.A. jaya Ram – Eastern Economy edition.

Reference Books:

1. Essentials of bridges engineering – D.Hohnson Victor oxford & IBH publishers co-Private Ltd.
2. Design of concrete bridges MC aswanin VN Vazrani, MM Ratwani, Khanna publishers.
3. Bridge Engineering – S.Ponnuswamy.
4. BRowe, R.E., Concrete Bridge Design, C.R.Books Ltd., London.
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Name of Faculty : **School of Engineering**

Name of Department: **Structure Design**

Minutes of Board of Studies Committee Meeting Dated on **4.6.2019**

The Board of Studies Committee Meeting was held in the room of Department of Civil Engineering at 10.15 AM. on **06.06.2022**, Following members were present.

1. Dr Ajay Swarup Prof.. (Civil Engineering), - Chairman
2. Dr P.K.Agarawal (Civil Engineering) External Member
3. Dr. S.K. Mittal (Civil Engineering), External Member
4. Dr. Jayant Mishra. Prof. (Civil Engineering), Member
5. Mr. Shailendera singh Thakur Asst. Prof. (Civil Engineering), Member
6. Mr. Amit Shukla Astd.Prof. (Civil Engineering), Member
7. Ms.Sheetal Verma Asst. Prof. (Civil Engineering), Member
8. Mr. Shelendra Singh Thakur Astd.Prof. (Civil Engineering) Member

The Chairman of Board of Studies Committee welcomes and appreciated the efforts put up by the faculty for progress of the departmental activities. The following Agenda points were discussed and resolved. The internal member of the committee suggested that the scheme and syllabus should be prepared as per current demand in the academics. The external member (Academic Expert) suggested for

- 1) Advance Foundation Engineering
 - 2) Low Cost Housing Technique
- be added as an elective.

Resolution of the discussion

On the basis of discussion the following amendmens were made. Scheme and syllabus were made. Scheme and syllabus was prepared as per current demand in the academics. The

- 1) Advance Foundation Engineering
- 2) Low Cost Housing Technique

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has been added as an elective Subject.

The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr Ajay Swarup Prof.. (Civil Engineering), - Chairman
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3. Dr. S.K. Mittal (Civil Engineering), External Member
4. Dr. Jayant Mishra. Prof. (Civil Engineering), Member
5. Mr. Shailendera singh ThakurAsst. Prof. (Civil Engineering), Member
6. Mr. Amit Shukla Astd.Prof. (Civil Engineering), Member
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Signature of All members (Including Chairman)

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7. Ms.Sheetal Verma Asst.Prof. (Civil Engin Mem
8. Mr. Shelendra Singh Thakur



Chairman



Registrar

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Name of Faculty : **School of Engineering**

Name of Department: **Structure Design**

Minutes of Board of Studies Committee Meeting Dated on **04.06.2019**

The Board of Studies Committee Meeting was held in the room of Department of Civil Engineering at 10.15 AM. on **04.06.2019**, Following members were present.

1. Dr Ajay Swarup Prof.. (Civil Engineering), - Chairman
2. Dr P.K.Agarawal (Civil Engineering) External Member
3. Dr. S.K. Mittal (Civil Engineering), External Member
4. Dr. Jayant Mishra. Prof. (Civil Engineering), Member
5. Ms. Kamni Laheriya, Asstt. Prof. (Civil Engineering), Member
6. Mr. Baldev Barde, Asstt. Prof. (Civil Engineering), Member
7. Mr. Babar Hussain, Asstt. Prof. (Civil Engineering), Member

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- 1) Advance Foundation Engineering
 - 2) Low Cost Housing Technique
- be added as an elective.

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- 1) Advance Foundation Engineering
- 2) Low Cost Housing Technique

has been added as an elective Subject.

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Sri Satya Sai University of Technology
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The Chairman thanks the members for peaceful conduction of meeting.

Signature of All members (Including Chairman)

1. Dr Ajay Swarup Prof.. (Civil Engineering), - Chairman
2. Dr P.K.Agarawal (Civil Engineering) External Member
3. Dr. S.K. Mittal (Civil Engineering), External Member
4. Dr. Jayant Mishra. Prof. (Civil Engineering), Member
5. Ms. Kamni Laheriya, Asstt. Prof. (Civil Engineering), Member
6. Mr. Baldev Barde, Asstt. Prof. (Civil Engineering), Member
7. Mr. Babar Hussain, Asstt. Prof. (Civil Engineering), Member

(Handwritten signatures: Ajay Swarup, P.K. Agarawal, S.K. Mittal)

(Handwritten signature: Jayant Mishra)

(Handwritten signature: Kamni Laheriya)

(Handwritten signature: Baldev Barde)

(Handwritten signature: Babar Hussain)

(Handwritten signature: Ajay Swarup)
Chairman

(Handwritten signature: Registrar)
Registrar
Sri Satya Sai University of Technolog
& Medical Sciences Sehore (M.P.)





Sri Satya Sai University of Technology & Medical Sciences, Sehore (M.P.)

Scheme of Examination

Third Semester –Master of Technology(Structural Design)

S.No.	Subject Code	Subject Name	Periods per week			Credits	Maximum marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments/Quiz	End Sem. Practical / Viva	Practical Record/assignment/Quiz/Presentation	
1.	MTSD-301	Elective I	3	1	-	4	70	20	10	-	-	100
2.	MTSD-302	Elective II	3	1	-	4	70	20	10	-	-	100
3.	MTSD 303	Seminar	-	-	4	4	-	-	-	-	100	100
4.	MTSD 304	Dissertation part-I (Literature Review/problem formulation/Synopsis)	8			8	-	-	-	120	80	200
Total			6	2	12	20	140	40	20	120	180	500

L: Lecture- T: Tutorial- P: Practical

w.e.f. July- 2014

Elective-I (MTSD-301)

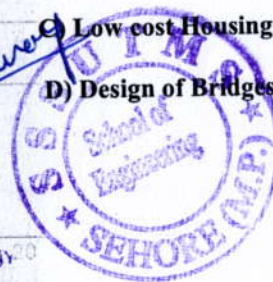
- A) Advanced Foundation Engineering
- B) Design of Earth Quake Resistant Structures
- C) Design & Analysis of Steel Structures
- D) Building Structure & Construction Management

Elective –II (MTSD-302)

- A) Design of Offshore Structures
- B) Fracture Mechanism
- C) Low cost Housing Techniques
- D) Design of Bridges

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MTSD 301(A) Advanced Foundation Engineering

UNIT 1

Soil Exploration: Introduction, Methods of exploration, Direct Methods and techniques of exploration, Methods of boring types of samples, Disturbance of soil sample, Soil samplers and sampling techniques, Ground water observations, Boring records, Spacing and depth of bore holes, Indirect methods of soil exploration, Penetration tests, Geophysical methods, Dynamics methods, Sequence of exploration programs

UNIT 2

Shallow Foundations: Introduction, General Requirements, Depth of foundation, Bearing capacity, Eccentric Inclined loads, Bearing capacity of stratified soils, Settlement of footings, Settlement of footings from constitutive laws, Settlement and tilt of eccentrically loaded footings, Allowable settlement, Plate bearing test, Standard penetration test Effect of water table, shallow foundation classification, Modulus of sub-grade reaction, Beams on elastic foundation, Raft foundation.

UNIT 3

Pile Foundation: Introduction, Uses of piles, Types of piles, pile drivers, Bearing capacity of piles, Static analysis, Pile load test, Dynamic methods, Other methods, 24 Negative skin friction, Pile group, Ultimate bearing capacity of pile groups, Settlement of pile group, Influence of pile cap. Laterally loaded piles, Ultimate resistance, Elastic methods, Pile groups under lateral load, batter pile under lateral load, Batter pile groups under inclined loads, pile under dynamic loads.

UNIT 4

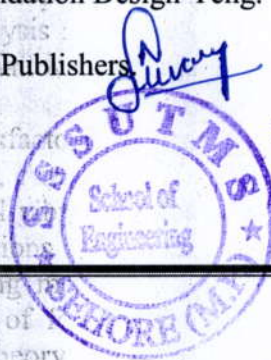
Coffer Dams: Introduction, types of Cofferdams, Design data for cellular cofferdam, Stability analysis of cofferdam, Interlock stresses. Foundations in black cotton soils basic foundation problems associated with black cotton soils. Lime column techniques principles and execution. Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

UNIT 5

Machine Foundations : Introduction, Criteria for satisfactory action of a machine foundation, Definitions, Degrees of freedom of a block foundation, Analysis of block foundation, Theory of linear weightless spring, Equivalent soil springs, Vertical vibration, Rocking vibration, Vibration in shear, Simultaneous rocking sliding and vertical vibrations for a foundation, Indian standard on design and construction of foundations for reciprocating machines, Foundations for impact type machines, Indian Standard on design and construction of foundations for impact type machines, Analysis of block foundation based on elastic half space theory.

References Books:

1. Bowles, Foundation: Analysis and Design, McGraw Hill Book CO. Inc.
2. Peck , R.B. , W.E. Hanson and T.H. Thornburn, Foundation Engineering, Wiley , New York
3. Foundation Design and Construction-Tomlinson • Foundation Design-Teng.
4. Geotechnical Engg – C.Venkatramaiah
5. Foundation Engineering by Brije.M.Das, Printice Hall Publishers



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MTSD-301 (B) Design of Earth quake Resistant Structures

UNIT 1

Seismic Strengthening of Existing Buildings: Cases histories-Learning from earthquakes, seismic strengthening procedures. Selection of materials and types of construction form of superstructure – framing systems and seismic units – devices for reducing. Earthquake loads,

UNIT 2

Torsion & Rigidity: Rigid Diaphragms, Torsional moment, Center of mass and center of rigidity torsion effects. Lateral Analysis of Building Systems: Lateral load distribution with rigid floor diaphragms, moment resisting frames, shear walls, lateral stiffness of shear walls, shear wall-frame combination, examples.

UNIT 3

Concept of Earthquake Resistant Design: Objectives of seismic design , Ductility, Hysteric response & energy dissipation, response modifications factor, design spectrum, capacity design, classification of structural system, IS code provisions for seismic design of structures, multi-storied buildings, design criteria, P-A effects, storey drift, design examples ductile detailing of RCC structures.

UNIT 4

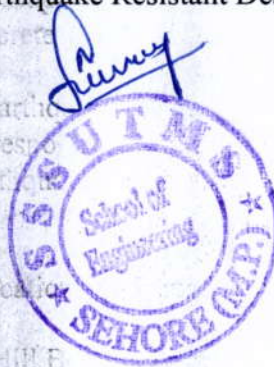
Seismic Design of Special Structures: Elevated liquid storage tanks, Hydrodynamic pressure in tanks, stack like structures, IS-1893 code provisions for bridges; Superstructures, substructures, submersible bridges, dams; Hydrodynamic effect due to reservoir, concrete gravity dams.

UNIT 5

Engineering Seismology: Basic terms, seismic waves, earthquake magnitude and intensity, ground motion, dynamic response of structures, normalized response spectra, seismic coefficients and seismic zone coefficients.Characteristics of Wind and Earthquake forces and its method of analysis.

Reference Books:

1. Chopra A.K., Dynamics of Structures', Theory & Applications to Earthquake Engineering , Prentice Hall India, New Delhi-1995
2. Clough & Penzien, Dynamics of Structures , McGraw Hill Book CO. Inc.
3. Paz M, Structural Dynamics, , Van Nostrand Reinhold, New York
4. Paz, M, International Handbook of Earthquake Engineering, Chapman & Hall, New York.
5. IS-1893-1984, Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S., New Delhi.
6. IS-4326-1993, Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S., New Delhi.




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MTSD -301 (C) Design & Analysis of steel Structures

UNIT 1

Matrix Method Analysis: Flexibility and stiffness matrices-Force displacement relationships for axial force, couple, torsional moments – stiffness method of analysis and flexibility method of analysis. Equation Solvers: Solution of system of linear algebraic equations-direct inversion method-gauss elimination method-Cholesky method-banded equation solvers frontal solution technique

UNIT 2

Columns: Basic concepts, strength curve for an ideal strut, strength of column members in practice effect of eccentricity of applied loading. Effect of residual stresses, concept of effective lengths, no sway columns, torsional and torsion flexural buckling of columns, Robertson's design curve, modification to Robertson approach, design of columns using Robertson approach.

UNIT 3

Laterally Restrained Beams: Flexural & shear behavior, web buckling & web crippling, effect of local buckling in laterally restrained plastic or compact beams, combined bending & shear, unsymmetrical bending. Unrestrained Beams: Similarity of column buckling of beams, lateral torsional buckling of symmetric section, factors affecting lateral stability, buckling of real beams, design of cantilever beams, continuous beams.

UNIT 4

Beams Columns: Short & long beam columns, effects of slenderness ratio and axial force on modes of failure, beam column under biaxial bending, strength of beam columns, local section failure & overall member failure.

UNIT 5

Beams Subjected to Torsion and Bending: Introduction, pure torsion and warping, combined bending torsion, capacity check, buckling check, design methods for lateral torsional buckling.

Reference Books:

1. Morsis L.J. Plum, D.R., Structural Steel Work Design
2. Sinha D.A., Design of Steel Structures
3. Yu, W.W., Cold Formed Steel Structures Design
4. John L.Meek., Matrix Struestructural Analysis, McGraw Hill Book company.
5. Structural Analysis by Pundit & Gupta
6. Structural Analysis by C.S.Reddy.
7. Structural Analysis – R.C.Hibbeler


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MTSD-301 (D) Building Structure & Construction Management

UNIT-1

Types constructions-public and private contract managements – scrutinizing tenders and acceptance of tenders, contracted, changes and terminating of contract – subcontracts construction organizations – organizational chart-Decentralization payrolls and records – organization chart of a construction company.

UNIT-2

Construction Practices and Resource Management– Time Management – bar chart, CPM, PERT – Progress report, Basic concepts equipment management, material management inventory control.

UNIT-3

Accounts Management – Basic concepts, Accounting system and book keeping, depreciation, Balance sheet, profit and loss account, internal auditing. Quality control by statistical methods, sampling plan and control charts, safety requirements.

UNIT-4

Cost and Financial Management – Cost volume relationship, cost control system, budget concept of valuation, cost of equity capital management cash. Labor and industrial; laws – payment of wages act. Contract labor, workmen" s compensation, insurance, industrial disputes act.

UNIT-5

Behavior of tall structures under static and dynamic loads, model analysis. Shear walls, Frame Structures, Coupled shear walls, Tabular Structures, Ductility and reinforcement details at joint. Design Criteria and Modeling of tall structures, case studies.

Reference Books:

1. Coull, Smith, Design of tall buildings
2. Taranath, Design of tall buildings
3. Construction Management and planning by B.Sengupata and H.Gula(Tata McGraw Hill)
4. Construction Management by Atkinson(Elsevier)
5. in principle land practice by EEC beech(Longman)
6. Robert Schultheis, Mary Summer "management information systems-The Management View."TATA Mc Graw Hill Edition, New Delhi.
7. Kwakye, A.A , Construction Project Administration Addison Wesley Longman, London.
8. Keith Davis, Human Behavior at Work, Mc Graw Hill, USA.
9. Sehroeder, R.G., Operations Management, Mc Graw Hill, USA.
10. James C.Van Horne, Financial Management and Policy, Prentice Hall of India Pvt.Ltd., 4th Ed., NewDelhi.



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MTSD-302 (A) Design of Offshore Structures

UNIT-1

Loads and structural forms of different types of offshore structures; Elements of single d.o.f. system subjected to free and forced vibration.

UNIT-2

Analysis for transient and steady state force; Equivalent damping for nonlinear systems; Dynamics of multi d.o.f. systems; Eigen values and vectors; Iterative and transformation methods.

UNIT-3

Mode superposition. Fourier series and spectral method for response of single d.o.f. systems; Vibrations of bars, beams and cones with reference to soil as half space.

UNIT-4

Behavior of concrete gravity platform as a rigid body on soil as a continuum; short and long term statistics of wind;

UNIT-5

Static wind load; Effect of size, shape and frequency; Aerodynamic admittance function and gust factor, spectral response due to wind for various types of structures; Wave loads by Morison's equation; Static and dynamic analysis of fixed structures; Use of approximate methods.

Reference Books:

1. Brebbia C.A. Walker, Dynamic Analysis of Offshore Str., Newnes Butterworth
2. Sarpakaya T and Isaacson M., Mechanics of wave forces on offshore structures, Van Nostrand Reinhold New York,
3. Hallam M.G. Heaf N.J. and Wootton, L.R., Dynamics of Marine Structures, CIRIA Publications Underwater Engg., Group, London
4. Graff W.J., Introduction to offshore Structures, Gulf Publishing Co., Houston, Texas
5. Clough R.W. and Penzine J., Dynamic of Structures - II Ed., McGraw Hill Book CO.
6. Simiu E. and Scanlan R.H., Wind Effects on Structures, Wiley, New York 1978
7. Codes of Practice (latest versions) , Such as API RP-2A ,Bureau Veritas etc.
8. Proceedings of Offshore Technology Conference (OTC) Behavior of Offshore Structures (BOSS) and other Conferences on offshore Engineering



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MTSD – 302(B) Fracture Mechanism

UNIT 1

Summary of Basic Problems and Concepts: Introduction - A crack in a structure - The stress at a crack tip - The Griffith criterion The crack opening displacement criterion - Crack Propagation - Closure.

The Elastic Crack-Tip Stress Field : The Airy stress function - Complex stress functions - Solution to crack problems - The effect of finite size - Special cases - Elliptical cracks - Some useful expressions

UNIT 2

The Crack Tip Plastic Zone: The Irwin plastic zone correction - The Dugdale approach - The shape of the plastic zone - Plane stress versus plane strain - Plastic constraint factor - The thickness effect.

The Energy Principle: The energy release rate - The criterion for crack growth - The crack resistance (R curve) - Compliance , The J integral (Definitions only)

UNIT 3

Plane Strain Fracture Toughness: The standard test - Size requirements - Non-Linearity - Applicability

Plane Stress and Transitional Behaviour: Introduction - An engineering concept of plane stress - The R curve concept

UNIT 4

The Crack Opening Displacement Criterion: Fracture beyond general yield - The crack tip opening displacement - The possible use of the CTOD criterion

UNIT 5

Determination of Stress Intensity Factors: Introduction - Analytical and numerical methods - Finite element methods, Experimental methods

Reference Books:

1. Elementary engineering fracture mechanics - David Broek, Battelle, columbus laboratories, columbus, Ohio, USA
2. Fracture and Fatigue Control in Structures - John M. Barsom, Senior consultant United States Steel Corporation & Stanley T. Rolfe, Ross H. Forney Professor of Engineering University of Kansas. & Stanley T. Rolfe, Ross H. Forney Professor of Engineering, University of Kansas .



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MTSD-302 (C) Low cost Housing Techniques

UNIT 1

Housing Scenario :Introduction - Status of urban housing - Status of Rural Housing. Introduction to - Existing finance system in India - Government role as facilitator - Status of Rural Housing Finance - Impediments in housing finance and related issues .

Land Use and Physical Planning for Housing: Introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye laws - Residential Densities

UNIT 2

Housing the Urban Poor: Introduction - Living conditions in slums - Approaches and strategies for housing urban poor .

Development and Adoption of Low cost Houing: Introduction - Adoption of innovative cost-effective construction techniques - Adoption of precast elements in partial prefatronics - Adopting of total prefactcation of mass housing in India- General remarks on pre cast roofing/flooring systems - Economical wall system - Single Brick thick load bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall - Flyash gypsym brick for masonary - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT 3

Alternative Building Materials for Low cost Housing: Introduction - Substitute for scarce materials - Ferrocement - Gypsum boards - Timber substitutions - Industrial wastes - Agricultural wastes - Alternative building maintenance

UNIT 4

Low Cost Infrastructure Services: Introduction to - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

Rural Housing: Introduction to traditional practice of rural housing-continuous Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT 5

Housing in Disaster Prone Areas: Introduction - Earthquake - Damage to houses - Disaster prone areas - Type of Damages and Repairs of non-engineered buildings - Repair and restoration of earthquake Damaged non-engineered buildings recommendations for future constructions Requirement" s of structural safety of thin precast roofing units against Earthquake forces Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety.



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Reference Books:

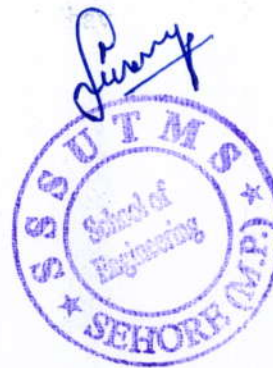
1. Building materials for low – income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Properties of concrete – Neville A.M. Pitman Publishing Limited, London.
4. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences.
5. Low cost Housing – G.C. Mathur.
6. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

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Reference Books:

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2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
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MTSD-302(D) Design Of Bridges

UNIT 1

Introduction : Classification, investigations and planning, choice of type – economic span length – IRC specifications for road bridges, standard live loads, other forces acting on bridges, general design considerations.

UNIT 2

Design of Box Culverts : General aspects – Design loads – Design moments, shears and thrusts – Design of critical section.

Design of Slab Bridges–:Effective width of analysis – workings stress design and detailing of slab bridges for IRC loading.

UNIT 3

T-BEAM Bridges: Introduction – wheel load analysis – B.M. in slab – Pigaud" s theory – analysis of longitudinal girders by Courbon" s theory working stress design and detailing of reinforced concrete T-beam bridges for IRC loading.

Prestressed Concrete Bridges: General features + Advantages of Prestressed concrete bridges – pretensioned Prestressed concrete bridges – post tensioned Prestressed concrete Bridge decks. Design of post tensioned Prestressed concrete slab bridge deck.

UNIT 4

Bridge Bearings : General features – Types of bearings – forces on bearings basis for selection of bearings – Design principles of steel rocker and roller bearings and its design – Design of elastometric pad bearing detailing of elastometric pot bearings.

Piers and Abutments: General features – Bed block – Materials for piers and abutments – types of piers – forces acting on piers – Design of pier – stability analysis of piers – general features of abutments – forces acting on abutments – stability analysis of abutments.

UNIT 5

Bridge Foundations: General Aspects – Types of foundations – Pile foundations – well foundations – caisson foundations.


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Reference Books:

1. Essentials of bridges engineering – D.Hohnson Victor oxford & IBH publishers co-Private Ltd.
2. Design of concrete bridges MC aswanin VN Vazrani, MM Ratwani, Khanna publishers.
3. Bridge Engineering – S.Ponnuswamy.
4. BRowe, R.E., Concrete Bridge Design, C.R.Books Ltd., London.
5. Taylor F.W., Thomson, S.E., and Smulski E., Reinforced concrete Bridges, John wiley and sons, New york.
6. Derrick Beckett, an Introduction to Structural Design of concrete bridges, surrey University; press, Henlely – thomes, oxford shire.
7. Bakht.B.and Jaegar, L.G. bridge Analysis simplified, Mc Graw Hill.
8. Design of Bridges – N.Krishna Raju – Oxford & IBH
9. Design of Bridge structures – FR Jagadeesh, M.A. jaya Ram – Eastern Economy edition.

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2. Design of concrete bridges MC aswanin VN Vazrani, MM Ratwani, Khanna publishers.
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