Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati(An Autonomous Institute)
Four Year Under Graduate Degree Program in Bachelor of TechnologyChoice Based Credit System (Semester Pattern)
Branch : Civil Engineering

SEMESTER: III																		
Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL			
											Internal		Total	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA			Int.	Ext.		
Theory																		
01	3SC01	Strength of Material	3			PCC	3	3	3	60	30	10	100	40				
02	3SC02	Concrete Technology	2			PCC	2	2	3	60	30	10	100	40				
03	3SC03	Transportation Engineering	3			PCC	3	3	3	60	30	10	100	40				
04	3SC04	Surveying - I	3			PCC	3	3	3	60	30	10	100	40				
05	3SC05	OE-1	2			OE	3	3	3	60	30	10	100	40				
06	3SC06	Construction Project & Management	2			EEMC	2	2	3	60	30	10	100	40				
07	3SC07	Environmental Studies	2			VEC	2	2	3	60	30	10	100	40				
Practicals																		
08	3SC08	Concrete Technology - Lab			2	PCC	2	1							25	25	50	25
09	3SC09	Transportation Engineering - Lab			2	PCC	2	1							25	25	50	25
10	3SC10	Strength of Material - Lab			2	VSEC	2	1							25	25	50	25
11	3SC11	Surveying - I - Lab			2	VSEC	2	1							25	25	50	25
Total			**17**		**8**		**26**	**22**					**700**				**200**	
															Total		**900**	

OE-1 : i) Disaster management ii) Social Sciences & Engineering Economics iii) Engineering Economics & Costing

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of TechnologyChoice Based Credit System (Semester Pattern)

Branch : Civil Engineering

SEMESTER: IV

Sr. No.	Course Code	Course Name	Teaching Scheme						Examination Scheme									
			Hours/ Week			Group	Total Hours/ Week	Credits	THEORY						PRACTICAL			
											Internal				Max. Marks			
			Lecture	Tutorial	P/D				Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
Theory																		
01	4SC01	Structural Analysis - I	3			PCC	3	3	3	60	30	10	100	40				
02	4SC02	Geotechnical Engineering-I	3			PCC	3	3	3	60	30	10	100	40				
03	4SC03	Environmental Engineering - I	3			PCC	3	3	3	60	30	10	100	40				
04	4SC04	MDM-1	3			MDM	3	3	3	60	30	10	100	40				
05	4SC05	OE-2	2			OE	2	2	3	60	30	10	100	40				
06	4SC06	Technical Report Writing	2			AEC	2	2	3	60	30	10	100	40				
07	4SC07	Entrepreneurship Development	2			EEMC	2	2	3	60	30	10	100	40				
Practicals																		
08	4SC08	Geotechnical Engineering-I Lab			2	PCC	2	1							25	25	50	25
09	4SC09	Environmental Engineering-I Lab			2	PCC	2	1							25	25	50	25
10	4SC10	Building Planning Designing & CAD			2	PCC	2	1							25	25	50	25
11	4SC11	Mini-Project			4	ELC	4	2							25	25	50	25
Total			**18**		**10**		**28**	**23**					**700**				**200**	
															Total		**900**	

OE-2 :- i) Fundamental of Vastushastra ii) Engineering Geology iii) Principle of Management

MDM 1 : Introduction to Environmental Engineering

Exit Option: Two relevant skill-based courses (excluding from list of courses undertaken in First to Fourth semesters) to qualify for Diploma

Title	Credit
Two relevant MOOC/NPTEL courses as decided by BOS	8
OR	
1. Internship (Min 120 hrs)	8

MDM-1 COURSES BASKET

Branch -->	AI&DS	CIVIL	CSE	EXTC	IT	IIOT	MECH
MDM1	*Introduction To AI	Introduction to Environmental Engineering	# DATA STRUCTURES	$BASIC ELECTRONICS & DIGITAL CIRCUITS	DATA SCIENCE	FUNTAMENTALS OF IOT	PRODUCTIVITY TECHNIQUES
	*** Except CSE IT**		**# Except IT AI&DS**	**$ Except IIOT IT**	**Except AI&DS CSE**		

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati

(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of Technology,

Branch: Civil Engineering

Syllabus of Semester-III

3SC01 Strength of Materials

Lectures/week: 03 **Credits: 03**

Tutorials: Nil

Course Prerequisites: 2SCM01 Engineering Mechanics

Course Objectives:

Students will be taught -

1. Concepts related to mechanical properties of material.
2. Application of principles of statics to find and draw axial force, shear force & bending moment diagrams.
3. Concepts related stresses in beams (Bending, Shear).
4. Concepts related principal stresses and Combined stresses.
5. Concepts related to torsion and column Theory.
6. Different methods to find slope & deflection of beams.

Course Outcomes:

At the end of course students will be able to -

1. Explain and find mechanical properties of material, the concepts of stress and strain and the stress-strain relationships for homogenous, isotropic materials. **(L2: Understand. (L3: Apply)**
2. Analyze the beam and draw axial force, shear force and bending moment for all types of loading. **(L4: Analyze)**
3. Explain and find bending stresses and shear stresses for the different cross section of beam also will able to draw bending and shear stress distribution diagram. **(L2: Understand, L3: Apply)**
4. Solve problems on the principal stresses and strains and combined stresses in structural members. **(L3: Apply)**

5. Explain fundamental concepts related to torsion and analyze thin cylinders subjected to internal pressures also find crippling load on column using Euler, Rankine's theory. **(L2: Understand, L3: Apply)**
6. Develop slope and deflection equations to find values of slope and deflection of beams subjected to loads. **(L3: Apply)**

Unit I: Mechanical properties:

Concept of direct and shear stresses and strains, stress-strain relations, biaxial and triaxial loading, elastic constants and their relationship, stress-strain diagrams and their characteristics for mild steel, tor steel, generalized Hook's law, factor of safety. Uniaxial stresses and strains: stresses and strains in compound bars in uniaxial tension and compression, temperature stresses in simple restrained bars and compound bars of two metals only.

Unit II: Axial force, shear force & bending moment diagrams:

Beams, loading and support conditions, bending moment, shear force and axial load diagrams for all types of loadings for simply supported beams, cantilevers and beams with overhangs, relation between shear forces, bending moment and loading intensity.

Unit III: Stresses in beams (Bending, Shear):

Bending: Theory of simple bending, section modulus, moment of resistance, bending stresses in solid, hollow and built up section. Shear: Distribution of shear stresses on beam cross sections.

Unit IV: Principal stresses:

Biaxial stress system, principal stresses, principal planes, Mohr's circle of stresses, principal strains. combined direct & bending stresses.

Unit V: Torsion and column theory:

Theory of torsion & assumptions, derivation of torsion equation, polar modulus, simple problem based on torsion equation. Thin cylinders subjected to internal pressures. Theory of long columns, Euler, Rankine;s formula.

Unit VI: Slope & deflection of beams:

Slope & deflection in statically determinate beams subjected to point loads, uniformly distributed loads, moments by Macauley's method.

Books Recommended:

1. Bhattacharyya Basudeb, Engineering Mechanics, Oxford University Press.
2. Bhavikatti, S. S. and Rajashekarappa, K. G., Engineering Mechanics, New Age International Publishers, New Delhi.
3. E. P. Popov, "Mechanics of Materials´, Prentice Hall of India, New Delhi.
4. S.Timoshenko and O. H. Young, 'Elements of Strength of Materials', East West Press Private Ltd., New Delhi.
5. Ferdinard L. Singer, 'Strength of Materials', Harper and Row, New York.
6. Shames, I. H., 'Introduction to Solid Mechanics', Prentice Hall of India, New Delhi.
7. R. K. Bansal, Strength of materials, Laxmi Publications Pvt Ltd.
8. Junnarkar, S. B., Mechanics of materials.
9. Mubeen, A., Mechanics of solids, Pearson education (Singapore) Pvt. Ltd.
10. Beer and Johston, Mechanics of materials, Mc-Graw Hill.
11. S. Ramamrutham, Strength of Materials, Dhanpat Rai Publishing Co Pvt Ltd.

3SC02- Concrete Technology

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: 1SC01Fundamental knowledge of Civil Engineering

Course Objectives:

Students will be taught -

1. About strength of hardened concrete and test to be performed on it.
2. Uses of different admixtures.
3. About mixing proportion of concrete for desirable strength.
4. Application of special concrete materials and special concreting methods.
5. About Factors affecting durability.
6. To understand elastic theory and concept of reinforced concrete

Course Outcomes:

At the end of the subject the students will be able -

1. To recognize concrete and RCC and will be able to perform desired test for suitability.
   (L2: Understand).
2. To decide and utilize the admixtures as per the need of Concrete.
   (L2: Understand, L3: Apply)
3. To understand importance of mix design. . **(L2: Understand)**
4. To understand need of special concrete as per different conditions. .
   (L2: Understand)
5. To understand causes of cracking in concrete and factors affecting durability.
   (L2: Understand)
6. To decide the way to design as per WSM. **(L2: Understand, L3: Apply)**

Unit I: Properties of hardened concrete

Hardened Concrete: Strengths of hardened concrete (Tensile & Compressive strength, Flexural & Bond strength), standard test methods as per IS, Failure mechanism under compression & tension, Stress-strain behavior of concrete, Overview of Modulus of elasticity, Creep & Shrinkage.

Unit II: Pozzolana and Admixtures

Admixtures and construction chemicals: Introduction, admixtures, plasticizers (Water reducers), action of plasticizers, dispersion, retarding effect, superplasticizers (High range water reducers), site problems in the use of plasticizers, retarders, accelerators, air-entraining admixtures, pozzolanic or mineral admixtures, fly ash, silica fume, rice husk ash, metakaolin, ground granulated blast furnace slag (GGBFS), IS code provisions for admixtures.

Unit III: Mix design

Introduction of mix design, factors governing mix design, IS Code method of mix design (IS: 10262 -2019) and Ambuja method.

Unit IV: Special concrete

Ready Mix Concrete Light weight concrete, fiber reinforced concrete, Roller compacted concrete, self-compacted concrete, high strength concrete, high performance concrete, high volume fly ash concrete. Special concreting techniques: Guniting, grouting and shotcrete concrete. Introduction & application of Ferrocement.

Unit V: Durability & Permeability of concrete

Causes of deterioration in concrete and durability problems, Factors affecting durability, cracking & causes of cracking, Carbonation induced & corrosion induced cracking, Alkali-aggregate reaction, Degradation by freeze & thaw, Sulphate attack, Durability under sea-water (marine environment)

Unit VI: Basic elastic theory

Basic elastic theory and concept of reinforced concrete, types of reinforcement, Analysis of rectangular sections by working stress method, design of singly reinforced beams.

Books Recommended:

1. Lea, F. M. The Chemistry of Cement and Concrete, Edward Arnold (Publishers) ltd.
2. Neville, A. M.: Properties of Concrete, Pitman Publishing Company.
3. Neville, Brooks: Concrete Technology, ELBS
4. Gambhir, M. L.: Concrete Technology, Dhanpat Rai and Sons
5. Orchard D. F.: Concrete Technology, Applied Science Pub Ltd.

6. Shetty, M. S.: Concrete Technology, S. Chand
7. Varshney, R. S.: Concrete Technology, Oxford Pub. house.
8. IS: 456-2000.
9. IS: 10262-2019.
10. Krishna Raju: Design of Concrete Mixes, Mc-Graw Hill.
11. Ambuja Cement Concrete Mix Design- Ambuja Technical Literature series 79.

3SC03 Transportation Engineering

Lectures/week: 03 **Credits: 03**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. Basics of Road construction like surveys, alignment principles, types of roads.
2. Various road studies for safe road design principles and essential geometry.
3. Various road pavements its construction and maintenance procedure.
4. Concepts regarding railway transportation and terms related to it.
5. Construction concepts of Airport runway, Apron layout, various survey and terms related to Airport Transportation.
6. Concepts regarding Tunnels and Bridges components types and related transportation study.

Course Outcomes:

At the end of course students will be able to -

1. Identify type of roads and its utility. **(L1: Remember)**
2. Understand the application of various road studies at time of survey and actual construction. **(L2: Understand)**
3. Understand design concepts of the various types of road pavements. **(L2: Understand)**
4. Understand rules regulations, signals, type of gauges and railway sleepers density. **(L2: Understand)**
5. Recognise the Airport features and design concept of components for aeroplane movement. **(L1: Remember)**
6. Identify types and components of Tunnels and bridges and its design components. **(L1: Remember)**

Unit-I: Highway

Road Transport characteristics, classification of Roads, Road Patterns, Alignment principles, Survey for highway.

Unit-II: Geometric Design

Cross sectional elements, Right of way, Camber, Gradient, Typical Highway cross section in embankment and in cutting, PIEV Theory, stopping sight distance, overtaking sight distance, super elevation.

Unit-III: Pavement and Traffic Engineering

Components of Flexible and Rigid pavement, Design factors, Traffic Characteristics, Traffic Studies, and construction procedure of Roads. Road parking system, traffic control devices and 3 E's of traffic

Unit-IV: Railway

Railway transportation, track sections, embankment & cutting. Points and crossing Left &right Hand turnouts. Permanent way, gauges, coning of wheels, components of permanent way, Sleeper density, Rail fixtures & fastening. Rail types and functions.

Unit-V: Airport

Agencies controlling national & international aviation, various surveys to be conducted, airport site selection, Aeroplane component parts, Aircraft characteristics. Airport obstructions: Zoning laws, wind rose diagram, Apron layout, Aircraft parking & parking system.

Unit-VI: Tunnel and Bridge Engineering

Tunnels- necessity, types, tunnel alignment, Size and shape of tunnels, and Tunnel Lining. Tunnel drainage, ventilation & lighting of tunnels. Bridge Engineering-Components, classification and identification, data collection, site selection, economic span, water way, scour depth, depth of foundation, Afflux, clearance and free board, different structural form culverts, types of foundation, abutments, piers and wing wall.

Books Recommended:

1) Khanna S.K. & Justo C.E. : Highway Engineering
2) Rao G.V. : Principles of Transportation& Highway Engg.
3) Dr.KadiyaliL.R. : Traffic Engg. & Transport Planning.
4) BindraS.P. : Principles & Practice of Bridge Engg.
5) Saxena &Arora : Railway Engineering.

6) Agrawal M.M. : Railway Engineering.
7) Khanna S.K., Arora M.G., Jain S.S. : Airport Planning & Design,
8) Srinivasan: Tunnel Engineering.
9) Shrarma S.K. : Principles, Practice & Design of Highway Engg.
10) Duggal A.K. &Puri V.P. : Laboratory Mannual in Highway Engg.

3SC04 Surveying I

Lectures/week: 03 **Credits: 03**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. To learn about the term surveying, various instruments and possible error.
2. To learn Linear Measurement methods and way of conduction.
3. To learn about the measurement at elevation and of Directions, contour development process.
4. To understand and learn performing Plane table surveying.

Course Outcomes:

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

1. Develop a sound knowledge of fundamental principles of Surveying. **(L3: Apply)**
2. Find out the vertical, horizontal, linear and angular measurements to arrive at solutions to basic surveying problems. **(L1: Remember)**
3. Determine the reduced levels of the points from staff readings using auto level and create contour maps. **(L5: Evaluate)**
4. Make use of magnetic bearings for traversing using compass. **(L3: Apply)**
5. Determine angle measurement, distance measurement, and co-ordinate measurement by Traversing. **(L5: Evaluate)**
6. To perform survey at elevation and conduct Plane Table survey. **(L4: Analyze)**

Unit I: INTRODUCTION:

Plane and geodetic surveys. Methods of location of a point- classification of surveys; principles of surveying, Errors in measurements- sources, types of errors and their treatment. Surveying instruments-temporary and permanent adjustment concept, principle of reversal. conventional symbols, and generalization.

Unit II: LINEAR MEASUREMENTS

Direct and indirect methods; Chain and tape measurements- corrections to tape measurements; Electronic methods- EDMs, Introduction and purpose of total stations.

Unit III: MEASUREMENT OF ELEVATIONS:

Various terms; Methods of height determination; Spirit leveling- different types of levels and staves; booking and reduction of data, classification and permissible closing error; profile leveling and cross sectioning; curvature & refraction and collimation errors; reciprocal leveling.

Contours- characteristics, uses.

Unit V: MEASUREMENT OF DIRECTIONS:

Bearings and angles; Compass surveying- magnetic bearings, declination, local attraction errors and adjustments.

Unit V: TRAVERSING:

Purpose and classifications; Compass and theodolite traverses, theodolites- different types, uses, methods of observation and booking of data, balancing of traverses, computation of coordinates, omitted Measurements.

Unit VI: PLANE TABLING:

Merits and demerits, accessories; orientation and resection; methods of plane tabling; three-point problem and solutions.

Books Recommended:

1. D. Clarke: Plane and Geodatic Surveying, Volume I & II
2. T.P. Kanetkar& Kulkarni: Surveying & Levelling, Part I & II.
3. B.C. Punmia : Surveying I & II.
4. N.N. Basak : Surveying & Levelling.

3SC05: OE I (i) Disaster Management

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. Basic conceptual understanding of disasters.
2. Different types of hazards and disaster and the challenges posed by disasters.
3. Approaches of Disaster Management.
4. Broad understanding about the basic concepts of safety and Disaster Management.
5. About the preparedness in disaster.
6. To build skills to respond to disaster.

Course Outcomes:

At the end of course students will be able to -

1. Understand the basics about Disaster. **(L2: Understand)**
2. Understand hazards posed by various disaster. **(L2: Understand)**
3. Understand Disaster Management strategies. **(L2: Understand)**
4. learn Concept of safety in various Disasters. **(L2: Understand)**
5. Learn About the preparedness in disaster. **(L2: Understand)**
6. Develop skills to responds to the disaster. **(L3: Apply)**

Unit I: Introduction

Concepts and definitions: disaster, hazard, vulnerability, risks severity, frequency and details, impact, prevention, mitigation.

Unit II: Disasters

Categories of disasters - natural and manmade Natural disasters (origin, causes and their management) – earthquake, tsunami, cyclone, flood, land slide. Disaster Profile of India.

Unit III: Disaster Impacts

Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

Unit IV: Disaster Preparedness

Pre-Disaster – Risk Assessment and Analysis, Early Warning System; Awareness.

During Disaster – Evacuation, Search and Rescue, Relief and Rehabilitation.

Post-disaster – Damage and Needs Assessment, Early Recovery, Reconstruction and Redevelopment;

Unit V: Disaster Management Mechanism

Institutional mechanism for Disaster Management, Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Disaster Management Act 2005, Disaster Management Authority (NDMA). Role of Various Agencies. Key responsibility of engineers in disaster reduction techniques

Unit V: Study of Important Disasters in India

Earthquakes in India, seismic zones of India, major fault systems of India plate. Major floods in India and various flood plains and rivers in India. Droughts in India, case study on Bhopal gas tragedy.

Books Recommended:

1. Action Plan for Earthquake, Disaster, Mitigation in V.K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
2. Disasters in India Studies of grim reality, Rawat Publishers, Jaipur,2005.
3. Disaster management, Savindra Singh, Jeetendra Singh, Pravalika Publications, Allahabad,2016
4. Natural Disasters, Mukta Girdhar, Amy publication, Dariyaganj, New Delhi, 2019.
5. Management of Natural Disasters in developing countries, H.N. Srivastava & G.D. Gupta, Daya Publishers, Delhi, 2006.

3SCO5: OE 1(ii) Social Sciences & Engineering Economics

Lectures/week: 2 Hours/week **Credits: 02**

Tutorials: Nil

Course Prerequisites: NIL

Course Objectives:

Students will taught -

1. About salient features Indian constitution, Fundamental Rights and Duties.
2. Information about Indian parliament composition and powers
3. Impact of science and technology on Indian Culture and Civilization evolution of human society
4. Economics and Engineers
5. Functions of banks and taxation
6. Economics of Development

Course outcomes:

At the end of the subject the students will be able to -

1. Understand about salient features of Indian constitution, Fundamental Rights and Duties **(L2: Understand)**
2. Define Indian parliament composition and powers. **(L1: Remember)**
3. Define Impact of science and technology on Indian Culture and Civilization evolution of human society **(L1: Remember)**
4. Understand significance of economics to engineers. **(L2: Understand)**
5. Understand different functions of banks and taxation **(L2: Understand)**
6. Understand Current Economics of Development **(L2: Understand)**

Unit I: Study of Social Science

Study of Social Science Importance to Engineer, salient features of Indian constitution. Fundamental Rights and Duties. Directive Principles of State Policy.

Unit II: Indian Parliament

Indian parliament composition and powers. President of India: Election and Powers. Council of Ministers and Prime Minister

Unit III: Culture and Civilization

Impact of Science and Technology on culture and Civilization. Human Society: Community Groups, Social Control : Meaning, Types and Agencies. Marriage and Family: Functions, Types and problems.

Unit IV: Economics and Engineers

Nature and scope of Economics: Special significance of Economics to Engineers. Production: Factors of production, Laws of return, Various Economic systems, Forms of Business organisation.

Unit V: Banking

Functions of Central and Commercial Banks. Taxation: Principle of taxation, Direct and Indirect taxes. Market : Forms, perfect and imperfect competition, pricing under perfect and imperfect competition, prices discrimination under monopoly.

Unit VI: Economics of Development

Meaning, Characterisitcs of under development, obstacles to Economic growth and vicious circle of poverty. Economic Planning: meaning, objective and salient features of current five years plan of India. Planning horizons, life structuring the alternatives. Economics of comparision of different alternative projects.

Books Recommended:

1. Pylee M.V.: Constitutional Govt. in India, S.Chand and Co.
2. Joshi G.N.: The Constitution of India, Macmillan India Ltd.
3. Mahajan: The Constitution of India, S.Chand, New Delhi.
4. Maclaver and Page : Principle of Sociology.
5. Davis K.: Human Society
6. Dewett and Varma J.D.: Elementary Economic Theory, S.Chand and Co.
7. A.N.Agrawal: Indian Economy, Problem of Development and Planning (Wiley Eastern Ltd), New Delhi.
8. S.K.Mishra: Indian Economy, Its Development Experience. Himalaya Pub.House, Bombay. 9. Datt R.K. : Indian Economy, S.Chand and Comp. New Delhi P.M.Sundharam
10. Dhingra I.C.: Indian Economy
11. E.Kuper: Economics of W.R.Development, McGraw Hill Co.,
12. Jemes L.E., R.R.Lee: Economics of W.R.Planning, McGraw Hill Co

3SCO5: OE 1(iii) Engineering Economics & Costing

Lectures/week: 2 Hours/week **Credits: 02**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught –

1. Basics of Economics and its application in the field of engineering.
2. Concepts of the time value of money and techniques for evaluation of engineering project
3. Skills required understanding cost statements/records of the product and its effect on decision making

Course outcomes:

At the end of the subject the students will be able to -

1. Understand the microeconomics concepts related to business and its impact on enterprise (**L2 Understand**)
2. Develop an awareness and understanding time value of money and techniques for evaluation of engineering project (**L3 Apply**)
3. Evaluate depreciation charges incurred for various projects with the help of sensitivity analysis. (**L5 Evaluate**)
4. Choose appropriate method for budget calculation of infrastructural/ commercial projects. (**L3 Apply**)
5. Apply cost concepts to analyse common business management decisions such as pricing a product and services. (**L3 Applying**)
6. Examine the functions of Indian government as well as commercial banks. (**L4 Analyse**)

Unit I: Engineering Economics:

Nature and scope, General concepts on micro & macro economics, The Theory of demand, Demand function, Law of demand and its exceptions, Elasticity of demand, Law of supply and elasticity of supply, Theory of production, Law of variable proportion, Law of returns to scale.

Unit II: Time Value of Money:

Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time – value equivalences, Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Unit III: Depreciation:

Defination, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single and multiple parameter sensitivity.

Unit IV: Capital Budgeting

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life, Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions.

Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Unit V: Cost Concepts

Elements of costs, Preparation of cost sheet, Segregation of costs into fixed and variable costs. Break-even analysis (Simple numerical problems to be solved)

Fixed and variable cost, Product and Process Costing, Standard Costing, Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction techniques.

Unit VI: Banking System

Banks: Meaning, nature, characteristic of the Indian banking system, functions of commercial banks, functions of Reserve Bank of India, Overview of Indian Financial System

Books Recommended:

1. Horn green, C.T., Cost Accounting, Prentice Hall of India

2. Riggs, J.L., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996 (Chapter 2,3,4,5,7,8,9,11,12)

3. Sasmita Mishra, “Engineering Economics & Costing “, PHI

4. Sullivan and Wicks, “Engineering Economy”, Pearson

5. R. Paneer Seelvan, “Engineering Economics”, PHI
6. Gupta, “Managerial Economics”, TMH
7. Lal and Srivastav, “Cost Accounting”, TMH

3SC06 Construction Project Management

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: NIL

Course Objectives:

Students will be taught -

1. Project Life Cycle and Project Development Steps.
2. To carry out project planning using tools like BAR chart, networking methods like CPM, PERT etc.
3. The process and need of Resource Smoothening / Leveling.
4. To develop planning's using Project Planner software.
5. The various management skills related to Quality, Safety and Inventory and Risk Handling.

Course outcomes:

At the end of the subject the students will be able –

1. Define the concept of a project. **(L1: Remember)**
2. Explain the fundamental concepts of Gantt Chart, Bar Chart, and Milestone Chart. **(L2: Understand)**
3. Apply network rules to ensure logical sequencing and dependencies in project activities. **(L3: Apply)**
4. Demonstrate the ability to create a PERT network diagram. **(L2: Understand)**
5. Discover various resource allocation strategies. **(L4: Analyze)**
6. Understand the importance of safety management in the workplace. **(L3: Apply)**

Unit I: Project

Project, Project Stakeholders, Project life cycle - Conceptual Phase, Planning Phase, Execution Phase, Termination phase. Work break down structure, Scheduling, Project Controlling. Role of decision in Project Management

Unit II: Bar Chart

Planning Tools: Basic concept of Gantt Chart, Bar Chart, Mile stone chart, their advantage, limitations and overcoming measures. Numerical on Bar Chart.

Unit III: Networking

Networking – Activity, Event, Dummy Activity, Network rule. Critical Path Method: Concept, technique, Critical path, Numerical on Time and Floats computation, concept of Updating Network and its numerical for computation.

Unit IV: PERT

PERT: Concept, technique, three time estimates, average time, Critical path, slack computation, S.D, Variance, Numerical on Probability computation,

Unit V: Resource Smoothening and Leveling

Concept of Resource Smoothening / Leveling. Numerical on Resource Smoothening Leveling. Introduction to Planning softwares, MSP, Primavera.

Unit VI: Management

Organization & Management: Concept & Types of Organization, Feyol's Principals of Management, Need and Concept of Quality Management, Safety Management, Inventory Management. Learning EOQ Analysis.

Books Recommended:

1. K. K. Chitkara, "Construction Project Management- Planning, schedule and controlling", second edition", Tata McGraw Hill Education pvt. Ltd, New Delhi.
2. B. C. Punmia & K. K. Khandelwal "PERT AND CPM''
3. John M. Nicholas and Herman steven, "Project management for engineers, business and technology", fourth edition, Routledge Publication, New York.
4. Prasanna Chandra, "Projects Planning, analysis, selection, financing, implementation and review", 7th edition, McGraw Hill Education India Pvt. Ltd., New Delhi.
5. Harold Kerzner, "Project Management system approach to planning, scheduling and controlling, second.
6. Kumar NeerajJha, "Construction Project Management- Theory and Practice", Pearson Education, New Delhi ,17..

3SC07 Environmental Studies

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: NIL

Course Objectives:

Students will be taught -

1. The importance of Environmental Studies.
2. The need of renewable and non-renewable energy resources.
3. The components, structures and types of ecosystem.
4. The Impact of different types of pollution.
5. Awareness about current environmental issues of India.
6. Role of population expansion on environmental and human health.

Course Outcomes:

At the end of the subject the students will be able to –

1. Understand the scope and importance of environmental studies **(L2: Understand)**
2. Apply the knowledge of renewable and non-renewable energy resources **(L3: Apply)**
3. Understand the concept of ecosystem. **(L2: Understand)**
4. Apply the knowledge of environmental pollution. **(L3: Apply)**
5. Understand the current environmental issues of India. **(L2: Understand)**
6. Understand the role of Information Technology in environment and human health. **(L2: Understand)**

Unit I: The Multidisciplinary nature of environmental studies:

Definition, scope and importance, Need for public awareness.

Unit II: **Renewable and non renewable resources:**

Natural resources and associated problems, Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies, Role of individual in conservation of natural resources.

Unit III: Eco Systems

Concept of an eco system, structure and function of an eco system, Producers, consumers, decomposers, Food chains, food webs. Introduction, types, characteristic features, structure and function of the following eco systems: Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit IV: **Environmental Pollution**

Definition, Causes, effects and control measures of: Air pollution, Water pollution, Noise pollution, role of an individual in prevention of pollution, Pollution Case Studies.

Unit V: Current Environmental Issues in India

Water conservation-development of watersheds, Rain water harvesting and ground water recharge, Eutrophication and restoration of lakes, Conservation of wetlands, Ramsar sites in India. Climate Changes – Global warming, Acid rain, Ozone layer Deflection, Waste Management - Swachha Bharat Abhiyan.

Unit VI: Human population and the environment

Population explosion- family welfare program, Environment and human health, Human rights, Women and child welfare, Role of information technology in Environment and human health.

Visit to environment assets-river / forest / grassland / hill / mountain. Visit to a polluted site-urban/rural/industrial/agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hills lopes, etc (field work equal to 5 lecture works)

Books Recommended:

1. Textbook of Environmental studies, Erach Bharucha, UGC
2. Fundamental concepts in Environmental Studies, D D Mishra, S Chand & Co Ltd
3. Environmental studies, Nidhi Dhawan, Kiran Bist, I.K. International House Pvt Ltd.

3SC08 Concrete Technology Lab

Practical: 02 Hours/week **Credits: 01**

Course Prerequisites: 1SC01 Fundamental knowledge of Civil Engineering

Course Objectives:

Students will be taught -

1. To learn Procedure of mix design.
2. To understand different properties of cement.
3. To be able to find out properties of sand.
4. To study several properties of concrete.

Course Outcomes:

Students will be able to-

1. Prepared different grades of concrete based on mix design. **(L2: Understand, L3: Apply)**
2. Choose grade of cement and quantity as per requirement. **(L2: Understand, L3: Apply)**
3. Know significance of mix design and testing of concrete in laboratory. **(L2: Understand, L3: Apply)**

List of Experiments/ Practicals:

List of Practicals in Concrete Technology & RCC Lab (Minimum eight practical from the list should be performed):

1. Mix Design (Compulsory).
2. Site visit and submission of site visit report (Compulsory).
3. Fineness of cement
4. Consistency and setting time of the cement
5. Soundness of cement
6. Compressive strength of cement
7. Sieve analysis of aggregate.
8. Bulking of sand (fine aggregate).
9. Silt content of sand.
10. Workability by slump cone test & compaction factor test
11. Admixture test as per IS 9103 & 6925.

12. Workability by flow table method.
13. Compressive & Tensile strength of concrete.
14. Nondestructive method-Rebound hammer.
15. Test on self-compacting concrete i.e. L-box test, V-funnel test etc.

3SC09 Transportation Engineering Lab

Practical: 02 Hours/week **Credits: 01**

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. Testing on construction materials for their suitability & economic utilization.
2. Identification & classification of the pavement materials into different groups according to their characteristics.
3. The classification, suitability, strength & stability of pavement materials.

Course Outcomes:

Students will be able to

1. Identify the grade & properties of bitumen. **(L1: Remember)**
2. Identify engineering properties of aggregate. **(L1: Remember)**
3. Develop technical skills for pavement Construction. **(L5: Evaluate)**

List of Experiments/ Practicals: (Any Five Practicals)

1. Determination of Los Angeles value of aggregate.
2. Determination of Abrasion value of Aggregates by the use of devil machine
3. Determination of Aggregate Impact value
4. Determination of Aggregate Crushing value
5. Determination of Flakiness and Elongation Index of Aggregate.
6. Determination of Viscosity of Bituminous material
7. Determination of softening point of bituminous material.
8. Determination of ductility of bitumen.
9. Determination of Marshal Stability value.
10. Field Visit. (**Mandatory**)

3SC10 Strength of Materials-lab

Practical: 02 Hours/week **Credits: 01**

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. Performance of practical's based on concepts related to Strength of Material.
2. Verify theoretical concept (laws) using practical performing

Course Outcomes:

Students will be able to -

1. Apply & utilize the theoretical & practical knowledge for performing shear, torsion and Tension test on steel specimen. **(L3: Apply)**
2. Verify theoretical concept (laws) using practical performing on deflection of beam for given specimen. **(L3: Apply)**
3. Apply & utilize the theoretical & practical knowledge for performing compression, modulus of rupture, hardness and Impact test on specimen (eg.-Wood, MS, Al, Cu, Brass etc). **(L3: Apply)**

List of Experiments/ Practicals:

1. Tension test on metals.
2. Compression test on timber.
3. Shear test on metals.
4. Impact test on metals.
5. Hardness test on metals.
6. Torsion test on metals.
7. Deflection of beams.
8. Modulus of rupture test.
9. Buckling of columns.

Minimum Seven (07) experiments/ Practical's are to be performed.

3SC11 Surveying I - Lab

Lectures/week: 02 Hours/Week **Credits: 01**

Tutorials: Nil

Course Prerequisites: NIL

Course Objectives:

Students will be taught –

1. Apply the principle of surveying for civil engineering applications.
2. Methods to calculate horizontal and vertical distances
3. Calculation of area, drawing plans using different measuring equipment at field level.

Course Outcomes:

Students will be able to -

1. Understand the concept of EDM, and measure the distance, area of the field using the instrument chain, compass. **(L2: Understand)**
2. Determine R.L's area and volume. **(L5: Evaluate)**
3. Study about types of compass, local attraction and its error. **(L3: Apply)**

List of Experiments/ Practical's:

(Minimum eight practical from the list should be performed)

1. Distance measurement by chain tape and EDM.
2. To Find the RL by Simple Leveling.
3. To Find the RL by Differential Leveling.
4. Profile and cross section leveling for road.
5. Measurement of bearings with prismatic compass.
6. Chain and compass traversing.
7. Local attraction detection- correction of bearings.
8. Measurement of Horizontal and Vertical angles using Theodolite.
9. To measure area of figure (Regular and irregular shape) by using digital planimeter.
10. Plane table surveying- Radiation, Intersection Method.

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati

(An Autonomous Institute)

Four Year Under Graduate Degree Program in Bachelor of Technology,

Branch: Civil Engineering

Syllabus of Semester-IV

4SC01 Structural Analysis - I

Lectures/week: 03 **Credits: 03**

Tutorials: Nil

Course Prerequisites: 3SC01Strength of Materials

Course Objectives:

Students will be taught -

1. Concept of statically determinate and indeterminate structures.
2. Analysis of continuous, cantilever and propped cantilever beams.
3. Analysis methods for beam, frames and trusses.
4. Analysis of 3 Hinge Arches.
5. Analysis of the Sway Analysis.
6. Concept of Plastic Analysis.

Course Outcomes:

At the end of the subject the students will be able to-

1. Understand the concept of Degree of Freedom, Condition of Equilibrium and Determinacy of Element. **(L2: Understand)**
2. Analyze Fixed Beams, Continuous Beams. **(L4: Analyze)**
3. Analyze 3 Hinged Arches and concept of Plastic Analysis. **(L4: Analyze)**
4. Apply the knowledge of Influence Line Diagram. **(L3: Apply)**
5. Analyze Beams, Portal Frames by using Slope Deflection Method with & without side Sway. **(L4: Analyze)**
6. Analyze Beams, Portal Frames by using Moment Distribution Method with & without side Sway. **(L4: Analyze)**

Unit I: Analysis of Fixed Beam & Continuous Beam

Classification of Structures, Concept of statically indeterminate Structures, Analysis of fixed beam and propped cantilever, Rotation and sinking of support. Analysis of Continuous beam by theorem of three moments, sinking of support.

Unit II: Analysis of Three Hinge Arch & Plastic Analysis

Three hinged arches subjected to static loads, bending moment, radial shear and axial thrust. Introduction to plastic analysis of steel structure, shape factor, plastic section modulus, Redistribution of moment, upper and lower bound theorems, collapse loads for beams, single bay, single storey portals.

Unit III: Influence Line Diagram

Influence line diagrams for reactions, bending moment and shear force for determinate beams. Rolling loads on simply supported beams concentrated and uniformly distributed loads, maximum shear force and bending moment, focal length.

Unit IV: Slope Deflection Method (SDM)

Analysis of continuous beams with and without sinking of support. Analysis of portal frames without side sway.

Unit V: Moment Distribution Method (MDM)

Analysis of continuous beams with and without sinking of support. Analysis of portal frames without side sway.

Unit VI: Sway Analysis by SDM & MDM

Slope deflection method: Application to portal frames with side sway. Moment distribution method: Application to portal frames with side sway.

Books Recommended:

1. Junnarkar, S. B., Mechanics of Structure, Volume I and II.
2. Jain and Arya, Theory and Analysis of Structures.
3. Reddy. C. S., Basic Structural Analysis, Tata-McGraw hill
4. Wang, C. K., Elementary Analysis of Structures
5. Norris and Wilbur, Elementary Structural analysis.

4SC02 Geotechnical Engineering - I

Lectures/week: 03 **Credits: 03**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. The various types of soil and its classification.
2. The index properties and engineering properties of soil.
3. The mechanics of compaction and factors affecting the compaction.
4. The concept of permeability and factors affecting to it.
5. The concept of seepage discharge and effective, neutral and total stress in soil mass.
6. The stress distribution in soil mass and its engineering applications.

Course Outcomes:

At the end of course students will be able to -

1. Determine the Index properties and Atterberg limits for soil classification. **(L1: Remember, L3: Apply)**
2. Understand the mechanics of compaction and quality control in field. **(L2: Understand)**
3. Explain permeability of soil and methods of dewatering. **(L4: Analyze)**
4. Calculate the seepage discharge. **(L4: Analyze)**
5. Calculate the shear strength of soil. **(L4: Analyze)**
6. Understand the concept of consolidation and stress distribution in soil mass. **(L2: Understand)**

Unit I: Soil Fundamentals and Its Properties

History of development of soil mechanics, formation of soil, its significance to the field problems. Soil properties and its classification, Definition of soil, soil as a three phase system, weight volume relationship, Index properties of coarse and fine grained soil, BIS classification of fine grained and coarse grained soil.

Unit II: Compaction of Soil

Compaction of soil, mechanics of compaction, factors affecting compaction, standard and modified Proctor test, their field Determination, zero air void line, concept of wet of optimum and dry of optimum, different structures of soil, field compaction and their control, CBR test and CBR values for soaked and unsoaked conditions.

Unit III: Permeability of Soil

Permeability of soil, Darcy's law and its validity, discharge and seepage velocity, factors affecting permeability, determination of coefficient of permeability in laboratory and field, permeability for stratified soil deposits, drainage and dewatering of soil and its various methods.

Unit IV: Seepage Analysis

Laplace equation and its derivation in Cartesian co-ordinate system, its application for the computation of discharge seepage, seepage pressure, quick sand condition, concept of flow net, characteristics and uses of flow net, preliminary problem of discharge, estimation of discharge through homogenous earthen embankment, concept of effective neutral and total stress in soil mass, methods of arresting seepage.

Unit V: Shear Strength of Soil

A physical concept of shear strength, introduction of Mohr's stress diagram, Mohr's failure criteria, Mohr-Coulomb's theory and development of failure envelopes, unconfined compression test, laboratory measurement of shear strength for different drainage conditions by direct shear test, triaxial test, merits and demerits of various shear strength tests.

Unit VI: Stresses in Soil Mass and Consolidation Theory

State of stress at a point, stress distribution in soil mass, Boussinesq's theory and its applications for point load, uniformly loaded, rectangular and circular area. Compression of laterally confined soil, concept of consolidation using spring analogy, Terzaghi's theory of one dimensional consolidation. e-p curve, compression index, swelling index, coefficient of compressibility, Consolidometer test, determination of Cv by Cassagrande's method for determination of pre-consolidation pressure.

Books Recommended:

1) Craig R. F.: Soil Mechanics
2) Lambe T. W. and Whiteman R. V.: Soil Mechanics, John Wiley and Sons, 1969
3) Terzaghi K. and Peck R. B.: Soil Mechanics in Engg. Practice, John Wiley & Sons, 1967
4) Gulhati S. K.: Engg. Properties of Soils, Tata McGraw Hill, New Delhi, 1978
5) Singh A.: Soil Engg. In Theory and Practice, Asia Publishing House, Mumbai
6) Venkataramiah C.: Soil Mechanics and Foundation Engineering
7) B. M. Das, Advanced Soil Mechanics
8) S. K. Garg: Soil Mechanics and Foundation Engineering
9) Arora K. R.: Soil Mechanics and Foundation Engineering
10) Murthy V. N.: Geotechnical Engineering, Principals and Practices of Soil Mechanics and Foundation Engineering

4SC03 Environmental Engineering - I

Lectures/week: 03 **Credits: 03**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Student will be taught-

1. Concept of sources and the demand of water
2. Basic characteristics of water and its determination
3. Design and concept of water treatment processes.
4. Operation and maintenance of water supply

Course Outcomes:

At the end of the subject the students will be able to -

1. Understand the water supply scheme and be able to estimate the quantities and quality of water for municipal use. **(L2: Understand)**
2. Explain the basic characteristics of water & its determination. **(L2: Understand)**
3. Understand the types of processes used to treat for municipal purposes. **(L2: Understand)**
4. Understand the fundamental engineering and science principles that are used to design and operate the processes used in treatment processes. **(L2: Understand)**
5. Explain the disinfection processes and introduce tertiary treatment. (**L2: Understand)**
6. Explain the different distribution systems. **(L2: Understand)**

Unit I: Quantity Estimation of water:

Introduction, Importance and necessity of water supply scheme, Water demand: Types of demand, factors affecting per Capita demand, variation in demand, design period and methods of population forecasting. Sources: Surface sources, groundwater sources, Intakes - type, location, requirement & features.

Unit II: Water quality and Aeration:

Water quality: General idea of water borne diseases, Physical, Chemical, and bacteriological characteristics and analysis of water, Standards of drinking water I.S. & WHO. Flow diagrams and layouts of different water treatment works.

Unit III: Aeration and Sedimentation:

Aeration: Purpose, types of aerators.

Sedimentation: Plain and with coagulation, different coagulants used, dose of coagulant, Jar test, Flocculation, clariflocculator. Design criteria for sedimentation tanks, surface loading, simple problems on design of sedimentation tanks.

Unit IV: Filtration

Filtration: Mechanism of filtration, types of filters, working, operational problems in filters, Simple design problems on rapid sand filters.

Unit V: Disinfection

Disinfection: Purpose, Mechanism, criteria for good disinfectant, Method of disinfectants, Types of chlorination. Use of bleaching powder -Simple problems.

Unit VI: About Tertiary treatments & Distribution system

Introduction to tertiary treatments-Reverse Osmosis, Softening and Defluoridation. Distribution systems: Requirements for a good distribution system, methods of distribution, systems and their layouts.

Books Recommended:

1. Kshirsagar S. R., "Water Supply Engineering", Roorkee Pub house, Roorkee.
2. Birde G. S. , "Water Supply and Sanitary Engineering", Dhanpat Rai and Sons, Delhi.
3. Steel E. W., "Water Supply and Sewerage", Mc-Graw Hill.
4. Punmia B. C. "water Supply Engineering". Laxmi publication.
5. Garg S.K. Water Supply Engineering, Khanna Publishers.

MDM 1: 4SC04 Introduction to Environmental Engineering

Lectures/week: 3 **Credits: 3**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

The students will be taught-

1. The water requirements and their estimation.
2. The different processes of water treatment.
3. Detailed study of solid wastes and air pollution.

Course Outcomes:

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

1. Explain the concept of water treatment. **(L2: Understand)**
2. Classify the different processes related to water treatment and wastewater treatment. **(L2: Understand)**
3. Apply knowledge to overcome the problem of air pollution and solid waste. **(L3: Apply)**
4. Discover knowledge regarding characteristics of solid waste. **(L4: Analyze)**
5. Discover knowledge regarding air pollution and its effects. **(L4: Analyze)**
6. Discover knowledge regarding noise pollution. **(L4: Analyz)**

Unit I: Quantity Estimation of Water.

Demand of water. Consumption for various purposes. Fire Demand, Per capita demand. Factors affecting consumption. Fluctuation in demand. Design period, forecasting population.

Sources: Surface sources, ground water sources, Infiltration Galleries, Relative merits of sources,assessment & suitability, selection.

Unit II: Water quality.

Impurities in water, their effects and significance water borne diseases, collection of water samples. Water analysis- physical, chemical and bacteriological. Water quality standards: I.S. & WHO, Flow diagrams and layouts of different water treatment works.

Unit III: Water Treatment Processes.

Aeration, Sedimentation, Flocculation, Filtration and Disinfection, working, their uses, maintenance.

Unit IV: Characteristics of solid waste.

Physical, chemical and biological analysis. Collection of solid waste:- Types of collection system and services, frequency of collection, methodology involved in setting up collection bins. Disposal of solid wastes:- Different methods, sanitary landfill, composting, incineration.

Unit V: Air Pollution.

Air pollution: Introduction to air pollution, various pollutants their sources and their effects on man and material, prevention or air pollution at sources.

Unit VI: Noise Pollution.

Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psycho-acoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise

Books Recommended:

1. Kshirsagar S.R. : Sewerage and Sewage Treatment, Roorkee Pub House, Roorkee.
2. Steel E.W. : Water Supply & Sewerage, McGraw Hill Book Co.
3. Birdie G.S. : Water Supply and Sanitary Engineering, Dhanpat Rai & Son's.
4. Environmental Engg By B.C. Punmia.
5. Environmental Engineering by R. Rajagopalan.

4SC05: OE 1(i) Fundamental of Vastushastra

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught to-

1. Basic ideology behind the use of vastushatra is to have better life.
2. The whole purpose of vastushatra is to create and attract positive cosmic energy.

Course Outcomes:

At the end of course students will be able to -

1. Understand the fundamentals of vastushastra. (**L2. Understanding**)
2. Understand the element of vastushastra. (**L2. Understanding**)
3. Understand the basics of interior and exterior of various building units. (**L2. Understanding**)
4. Understand the orientations of various rooms of residential as per vastushastra. (**L2. Understanding**)
5. Understand the importance of direction. (**L2. Understanding**)
6. Understand the defects as per vastu and remedial measures to rectify. (**L2. Understanding**)

Unit I: Introduction of Vaastu

Scientific background of Vaastu, Understanding Life force Energy, nature of the globe as per vaastu the birth of vaastu purusha,

Unit II : Element of Vastu

Importance of Five Elements. Earth, Water, fire, Air, Space. Use of Magnetic Compass, Types, shapes and selection of Land.

Unit III: Interiors and Exteriors

Open Space planning and Building Design, Floor level, Height factors, Verandas, Balconies, Porch, Basements, Sumps & Borings, Boundary Walls, Parking, Security Guard Room, Overhead Tanks, Septic Tanks, Water flow, Plants and Greenery.

Unit IV: Orientation of Home

Master Bed Room , Kids room, Living Room, Kitchen, Dining Room, Bathroom, Drawing room, Study Room, Puja Room, Library, Store room, strong room, Furniture making, Doors, Windows and ventilators, Main Entrance, Staircase, Servants room, Guest room.

Unit V Ashtalaxmi and Quality of Directions

Directions and elements, importance of north-east direction as per vastu, importance of south –east direction as per vastu for home or workplace, importance of south direction as per vastu, importance of south-west direction as per vastu, importance of north direction as per vastu, importance of east direction as per vastu, importance of center (brahmasthan) direction as per vastu, importance of north – west direction as per vastu, importance of west direction as per vastu.

Unit VI: Remedial Vaastu

Identifying the Vastu Defects, Rectification of Vastu Defects in Existing Building, Color therapy, Discussion on different building plans.

Books Recommended:

1. Ancient Science of Vastu by Siddharth Board and Dr. JayshreeOm.
2. Remedial Vaastu for home by Janhavi N. Sahasrabuddhe and Narendra Hari Sahasrabuddhe.
3. Scientific VaastuShastra in Home by Patel Sarjoo

4SC05: OE II (ii) Engineering Geology

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. The different branches of geology and its importance.
2. The study of rock mineralogy and petrology.
3. The structural geology and its effect on foundation design.
4. The different zones of earthquake in India, its magnitude and intensity.
5. The different types of geological investigation.
6. The various applications of engineering geology related to civil engineering.

Course Outcomes:

At the end of the subject the students will be able to -

1. Understand the different branches of geology and its importance in civil engineering. (**L2: Understand)**
2. Classify the different types of rocks based on its formation and textures. **(L3: Apply)**
3. Analyse the effect of different structural geology in design of foundation. **(L4: Analyse)**
4. Understand the different earthquake zones of India and its seismic coefficient. (**L2: Understand)**
5. Understand the different types of geological investigation. (**L2: Understand)**
6. Select the suitable construction sites based on concepts of engineering geology related to civil engineering structures. **(L1: Remember, L3: Apply)**

Unit I: Introduction to Mineralogy

Different branches of Geology and importance of Geology in Civil Engineering, Mineralogy: Study of common rock forming and ore minerals with reference to its physical properties.

Unit II: Introduction to Petrology

Petrology: Rock cycle, rock weathering and soil formation, Origin, classification and textures of igneous, sedimentary and metamorphic rocks, study of common rock types.

Unit III: Structural Geology

Outcrop, dip strike, elementary ideas about folds, faults, joints and unconformity, effect of these structures in foundation.

Unit IV: Earthquake Engineering

Earthquake waves, causes and effects, magnitude and intensity, earthquake zones of India, seismic coefficient.

Unit V: Geological Investigation

Surface and sub-surface investigation, direct and indirect investigation, rock as a material of construction, study of engineering properties of rocks and soils.

Unit VI: Applications of Engineering Geology

Geological studies related to site selection for dams and reservoirs, tunnel alignment, hydroelectric plants, bridges, roads, air fields etc. Case histories of some major projects of tunnels, dams and reservoirs.

Books Recommended:

1. Singh Parbin: General and Engineering Geology.
2. Mukharjee: A Text Book of Geology.
3. Tuyrell G. W.: The Principle of Petrology.
4. Wadia D. N.: Geology of India.
5. Krishan M.S.: Geology of India.
6. Date S. Y. and Mukharjee D. M.: Geological Maps.
7. Deshmukh D. N. and Mukharjee D. M.: Engineering Geological Maps.
8. Gupte R. B.: Geology of Engineering.
9. Reddy Venkata: Engineering Geology.

4SC05: OE II (iii) Principles of Management

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. Basic concept of Management.
2. About scientific management process.
3. Importance of strategic management.
4. Concept of organization.
5. Concept of Leadership and role of a leader.
6. Importance of Communication in the Workplace.

Course Outcomes:

At the end of course students will be able to -

1. Understand about concept of management (**L2: Understand)**
2. Learn about scientific management process. **(L2: Understand)**
3. Understand Importance of strategic management. **(L2: Understand)**
4. learn Concept of organization. **(L2: Understand)**
5. Learn About Leadership and role of a leader. **(L2: Understand)**
6. Understand Importance of Communication in the Workplace**. (L2: Understand)**

Unit I Introduction to Management:

Management – An Emerging Profession, Definition, Nature, Scope, Purpose, and characteristics of Management, Functions, roles, skills of an effective Manager

Unit II Evolution of Management:

Classical Theory, Scientific Management, Management Process or Administrative Management, Bureaucracy, Behavioral Science Approach, Quantitative Approach, Systems Approach, Contingency Approach, Operational Approach

Unit III Planning:

Types of Plans, Planning Process, Introduction to Strategic Management, Types of Strategies, Understanding environment of business: Environmental appraisal

– Industry Analysis - Porter's Model of competitive advantage, analysis of organizational resources and capabilities

Unit IV Organizing and Directing:

Introduction, Organizational Design, Hierarchical Systems, Organization Structure, Types of Organization Structure, Formal and Informal Organization, Centralization and Decentralization, understanding authority and responsibility.

Unit V Leadership styles of Managers:

Leadership Concept, Nature, Importance, Attributes of a leader, Role of a leader in demonstrating awareness of legal, personnel, and strategic issues relating to globalization, culture and gender diversity in an organization, Role of leader in conflict resolution and negotiations

Unit VI Organizational Communication:

Communication in Organizations: Introduction, Importance of Communication in the Workplace; Understanding Communication Process, Barriers to Communication, Use of tone, language and styles in Communication, Role of Perception in influencing communication, Role of culture in communication

Books Recommended:

1. Stephen P. Robbins, David A. Decenzo, 2016. Fundamentals of Management, Pearson Education, 9th Edition
2. Management Fundamentals: Concepts, Applications, & Skill Development, 6th edition, Sage. 2014
3. Richard L. Daft, Principles of Management, Cengage Learning. 2009
4. Harold Koontz, O'Donnell and Heinz Weihrich, 2012. Essentials of Management. New Delhi, 9th edition, Tata McGraw Hill
5. Kotler, P., Keller, Kevin Lane Keller et al. Marketing Management, 3rd Edition, 2016.
6. Richard I Levin, David S Rubin, Statistical management, 7th Edition, Prentice Hall India, 2011.

4SC06 Technical Report Writing

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: NIL

Course Objectives:

Students will be taught -

1. The Characteristics of technical report.
2. To develop effective planning for technical reports.
3. The technical writing styles and terminology.
4. About the structure of technical report writing.
5. About the importance of Presentation Skills.

Course outcomes:

At the end of the subject the students will be able to–

1. Explain the key characteristics of technical report, their types and importance. **(L2: Understand)**
2. Do effective planning for well-organized technical reports writing. **(L3: Apply)**
3. Understand and use different writing styles. **(L2: Understand)**
4. Understand technical reports formats. **(L2: Understand)**
5. Prepare a technical report. **(L3: Apply)**
6. Understand the process of sound technical presentation. **(L2: Understand)**

Unit 1: Introduction to Technical Writing

Characteristics of technical report, Importance and its types. Routine Reports. Considerations in Technical Writing.

Unit 2: Planning and Preparation

Important Preparatory Steps, Sources of Data, Evaluation of Material, Note-Making, Organizing content, Principles of organization, Making Outline.

Unit 3: Writing Style

Definition of Style, The Scientific Attitude, Readability- Readability Formulas, Choice of words and phrases, Construction and Length of sentences, Construction and Length of paragraphs, Incorporating Visual Elements: Tables, Figures, and Graphs.

Unit 4: Technical Report

Structure and Layout Elements of Structure, Front Matter- Cover, Frontispiece, title page, copyright notice, forwarding letter, preface, acknowledgement, table of content, list of illustration, abstract. Main Body- Introduction, discussion, conclusion, recommendation. Back Matter- appendices, references, Bibliography, Glossary, Index.

Unit 5: Writing the Report

Rough Draft, Process of Writing, Order of Writing, The Final Draft, Check-List for Reports. Different types of Report. Prepare a technical report.

Unit 6: Oral Presentation

Importance of Acquiring Oral Presentation Skills, Body Language, Voice Modulation, Audience Awareness, Presentation Plan, Visual Aids, Use of Connectives, Checklist, Evaluation, Brochure, Conducting a Meeting, Participating in a Meeting.

Books Recommended:

1. “Business Correspondence and Report Writing”, by R. C. Sharma and Krishna Mohan. Tata McGraw Hillbooks.
2. Technical Communication: Principles and Practice" by Meenakshi Raman and Sangeeta Sharma
3. "Business and Technical Communication: A Guide to Writing Professionally" by Paul V. Anderson
4. "Handbook of Technical Writing" by Gerald J. Alred, Charles T. Brusaw, and Walter E. Oliu
5. "Effective Technical Communication" by M. Ashraf Rizvi
6. "Technical English: Writing, Reading, and Speaking" by Nell Ann Pickett and Ann Appleton Laster
7. "Communication Skills for Engineers and Scientists" by Patrick J. Garrity

4SC07 Entrepreneurship Development

Lectures/week: 02 **Credits: 02**

Tutorials: Nil

Course Prerequisites: - NIL

Course Objectives:

Students will be taught –

1. Understand the fundamentals of entrepreneurship and its relevance to civil engineering.
2. Identify opportunities for innovation within the civil engineering sector.
3. Develop skills to create simple business plans for civil engineering ventures.
4. Analyze market trends and conduct market research specific to civil engineering projects.
5. Develop critical thinking, problem-solving, and decision-making skills applicable to entrepreneurship in civil engineering.

Course outcomes:

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

1. Identify challenges and opportunities in the civil engineering industry. **(L3: Apply)**
2. Analyze the importance of having an entrepreneurial mindset in business and personal development **(L4: Analyze)**
3. Understand the various types of enterprises within the civil engineering sector. **(L2: Understand)**
4. Apply market research techniques to uncover hidden opportunities within niche markets. **(L3: Apply)**
5. Explain the significance of market research in the context of civil engineering projects. **(L2: Understand)**
6. Understanding of various government schemes aimed at providing financial assistance to new businesses. **(L2: Understand)**

Unit I - Introduction to Entrepreneurship in Civil Engineering

Definition, concept of entrepreneurship, Need of Entrepreneurship, Importance of entrepreneurship in civil engineering

Unit II - Characteristics and types of Entrepreneur

Entrepreneurial Mindset, Characteristics of entrepreneur, types of entrepreneur, functions of an entrepreneur, Characteristics of successful entrepreneurs.

Unit III - Types of Enterprises in Civil Engineering

Introduction to Civil Engineering Enterprises, Construction Enterprises, Consulting Enterprises, Infrastructure Development Enterprises, Government Enterprises, Design Enterprises, Environmental Enterprises

Unit IV - Business opportunity Identification

Understanding niche markets within civil engineering, Methods for identifying untapped markets and unmet needs, Identifying opportunities for innovation in civil engineering

Identification of opportunities arising from new technologies

Unit V - Business opportunity Evaluation:

Conducting market research specific to civil engineering ventures, Identifying target markets and customer segments, methods for evaluating market demand and feasibility

Unit VI - Financial Assistance to New Businesses

Different Government schemes to start a business such MSME, PMEGP, DIC, KVIC, MIDC, MCED, Khadi-udyog

Books Recommended:

1. **Introduction to Entrepreneurship in Civil Engineering:**
    - "Entrepreneurship Development" by S. ANil Kumar and C. Sankar
    - "Entrepreneurship: Starting and Operating a Small Business" by Steve Mariotti and Caroline Glackin
2. **Characteristics and Types of Entrepreneurs:**
    - "Entrepreneurship and Small Business Management" by Vasant Desai
    - "Entrepreneurship Development in India" by S. Anil Kumar and C. Sankar
3. **Types of Enterprises in Civil Engineering:**
    - "Handbook of Civil Engineering" by P.N. Khanna
    - "Civil Engineering: Conventional and Objective Type" by R.S. Khurmi and J.K. Gupta
4. **Business Opportunity Identification:**

- "Entrepreneurship and New Venture Management" by Karam Pal
- "Opportunity Identification and Entrepreneurial Behavior" by Jay Mitra

5. **Business Opportunity Evaluation:**
    - "Market Research and Analysis" by G.C. Beri
    - "Principles of Marketing" by Philip Kotler and Gary Armstrong
6. **Financial Assistance to New Businesses:**
    - "Entrepreneurial Finance" by J. Chris Leach and Ronald W. Melicher
    - "Financial Management" by Prasanna Chandra
7. The Entrepreneurial Instinct: How Everyone Has the Innate Ability to Start a Successful Small Business. Author - Mehta, Monica. Publication - McGraw-Hill Education, New Delhi, 2012, ISBN 9780-07-179742-9

4SC08 Geotechnical Engineering – I Lab

Practical: 02 Hours/week **Credits: 01**

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. The various index properties of soil and its determination.
2. The classification of soil based on its index properties
3. The various engineering properties of soil and its significance in the field of civil engineering

Course Outcomes:

Students will be able to -

1. Identify the type of soil based on its soil properties **(L1: Remember)**
2. Determine all index properties and engineering properties of soil **(L3: Apply)**
3. Understand the critical behaviour of soil based on its properties. **(L2: Understand)**

List of Experiments/ Practicals:

1. Determination of specific gravity of soil solids by Pyconometer or density bottle method.
2. Determination of moisture content by oven drying method/torsion balance method.
3. Determination of field density of the soil by sand replacement / core cutter method.
4. Determination of grain size distribution by mechanical sieve analysis.
5. Determination of Atterberg's limits (LL, PL and SL).
6. Determination of compaction properties by standard proctor test/modified proctor test.
7. Determination of permeability of soil by using falling head test/constant head method.
8. Determination of shear strength parameters by direct shear test (box shear test)
9. Determination of shear strength by unconfined compressive strength test.
10. Determination of shear strength parameters by triaxial shear test (UU type).
11. Determination of CBR value by conducting lab CBR test (soaked/unsoaked).
12. Determination of Coefficient of consolidation by conducting consolidation test.

Minimum Eight (08) experiments/ Practical's are to be performed.

4SC09 Environmental Engineering-I Lab

Practical: 02 Hours/week **Credits: 01**

Course Prerequisites: Nil

Course Objectives:

Students will be taught -

1. Importance of water quality standards.
2. An ability to perform various physical and chemical tests on water sample.
3. An ability to understand various biological tests performed on water sample and to perform a few biological tests on water.

Course Outcomes:

Students will be able to -

1. Examine water quality standards and relate water quality with permissible standards **(L2: Understand)**
2. Experiment on various characteristics of water. **(L3: Apply)**
3. Evaluate different characteristics of water. **(L5: Evaluate)**

List of Experiments/ Practicals:

1. Determination of Turbidity of water.
2. Determination of pH of the water.
3. Analysis of Dissolved, Suspended and Total solids
4. Analysis of Volatile and Fixed solids
5. Optimum coagulant dose
6. Determination of Temporary and Permanent Hardness of water.
7. Determination of residual chlorine in the given water.
8. Determination of Acidity and alkalinity of water.
9. Determination of Iron and Manganese
10. Determination of Electrical Conductivity of water.
11. Total Count of Bacteria Test
12. Report of Field visit to Municipal water treatment plant

Minimum Eight (08) experiments/practical are to be performed. Field visit is compulsory.

4SC10 Building Planning Designing & CAD

Practical: 02 Hours/week **Credits: 01**

Course Prerequisites: 1SF03 Engineering Graphics; 1SC02 Fundamentals of Civil Engineering Lab

Course Objectives:

Students will be taught

1. Need of engineering drawings and methods of drawing.
2. About building bylaws and its application on residential and public buildings.
3. To draw submission and working drawings.

Course Outcomes:

Students will be able to -

1. Understand different lines, symbols and abbreviations use in building. **(L2: Understand)**
2. Understand and prepare drawings of different buildings by using building regional bylaws **(L2: Understand; L3: Apply)**
3. Design of working and submission drawing. **(L6: Create)**

Practicals to be performed from the list as below: (Any eight)

1. To write and draw abbreviations and graphical symbols for materials, doors, windows, sanitary and water supply installations, electrical installations as per IS 962:1989.
2. To study and draw different types of Footings/ Foundations (Draw free hand sketches on sketchbook)
3. To study and draw section through wall (Draw free hand sketches on sketchbook)
4. To study and draw different types of stairs (At least 02 on sketchbook)
5. To study components of RCC Framed structure building (At least 02 using Auto CAD)
6. Study of the IS code provisions for the building drawing and building byelaws for government authorities (Amravati Region)
7. To draw line plan of residential (1 sheet) with staircase, WC and bath. (on A3 size graph paper)

8. To draw line plan of public buildings. (2 sheets) (on A3 size graph paper)
9. To draw submission drawing (RCC frame structure) of given line plan, showing developed plan, elevation, section passing through staircase **and** W.C. and Bath, site plan with area statement and other details.{**Draw drawing on A2 size sheet and Auto-CAD software}. (Compulsory)**
10. To draw working drawing (Load Bearing structure) of given line plan, showing developed plan, elevation, side view, section passing through staircase **and** W.C. and Bath, site plan.{**Draw drawing on A2 size sheet and Auto-CAD software} (Compulsory)**

4SC11 Mini Project

Practical: 04 Hours/Week **Credits: 02**

Course Prerequisites: 3SC11 Surveying I Lab

Course Objectives:

Students will be taught -

1. Application of class knowledge for field problems.
2. Apply the knowledge of surveying with comprehensive and systematic approach on the field

Course Outcomes:

At the end of course students will be able to -

1. Demonstrate the application of knowledge acquired from classes for the development of project. **(L2: Understand)**
2. Determine the project related activities effectively and communicate it efficiently **(L5: Evaluat)**
3. Elaborate the methods studied in the course to the team in the development of technical projects. **(L6: Create)**

Any one Group Project in details.

1) Irrigation Project
2) Rehabilitation of Village / Town
3) Water Supply Project
4) Sewerage System
5) Bridge on River
6) Flood Relief Structures
7) Any project related to Civil Engineering.

Students should conduct a detailed survey in a seven day camp. Data Analysis, Design & Submit Report & Drawing sheets