Jabalpur Engineering College, Jabalpur
(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)
(AICTE Model Curriculum Based Scheme)
Bachelor of Technology (B.Tech.) III Semester (Civil Engineering)

w.e.f. July 2023

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical						
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work		L	T	P	
1	MA31	BSC	Mathematics-III	70	20	10	-	-	100	3	1	-	4
2	CH32	HSMC	Energy & Environmental Engineering	70	20	10	-	-	100	3	1	-	4
3	CE33	PCC	Strength of Material	70	20	10	30	20	150	3	-	2	4
4	CE34	PCC	Engineering Geology	70	20	10	30	20	150	3	-	2	4
5	CE35	PCC	Building Design and Drawing	70	20	10	30	20	150	3	-	2	4
6	CE36	ESC	Software Lab-I	-	-	-	30	20	50	-	-	4	2
			Total	350	100	50	120	80	700	15	2	10	22
7	CE37	DLC	Self-Learning Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	-	-	-	-	8
8	CE38	MC	NSS/NCC/Swatchhata Abhiyan/Rural Outreach	Qualifier									
Additional Course for Honours or Minor Specialization				Permitted to opt for maximum two additional MOOC courses in subject code CE37 for the award of Honours (Minor Specialization).									

Note: MOOC/NPTEL subjects shall be taken with permission of HOD/Coordinator

| 1 hour lecture (L) = 1 credit | 1 hour Tutorial (T) = 1 credit | 2 hour Practical (P) = 1 credit |

BSC: Basic Science Course, HSMC: Humanities & Social Sciences including Management Course, PCC: Professional Core Course, ESC: Engineering Science Course, MC: Mandatory Course, DLC: Distance Learning Course

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(AICTE Model Curriculum Based Scheme and Syllabus)
Bachelor of Technology (B.Tech.) III Semester, Branch (CE/ME/IP)

		COURSE CONTENT						w.e.f. July 2023	
Subject Code	Subject Name	Maximum marks Allotted			Total marks	Hours/Week			Total Credit
MA31	MATHEMATICS-III	Theory				L	T	P	
		End Sem	Mid-Sem Exam	Quiz/ Assignment	100	3	1	0	4
		70	20	10					

Module 1: Numerical Method-I (08 hours)
Roots of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Iteration method, Graffes root squaring method, Solution of system of linear equations: Gauss elimination method, Gauss Jordan method, LU decomposition method, Relaxation method, Jacobi and Gauss-Seidel methods.

Module 2: Numerical Method-II (08 hours)
Interpolation: Finite difference operator and their relationships, Difference tables, Newton, Gauss, Bessel and Stirling's interpolation formulae, Divided differences, Lagrange interpolation and Newton's divided difference interpolation. Numerical differentiation and Integration: First and second order derivatives by various interpolation formulae, Trapezoidal, Simpsons $1/3^{rd}$ and $3/8^{th}$ rules.

Module 3: Numerical Method-III (10 hours)
Numerical solution of ordinary differential equations: Solution of ODE by Taylor series, Picard's method , Modified Euller method, Runge-Kutta method, Predictor corrector method. Partial differential equations: Finite difference, solution of two-dimensional Laplace and Poission's equations, Implicit and explicit methods for one dimensional heat equation (Bendre Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

Module 4: Applied Statistics (08 hours)
Curve fitting by the method of least squares- Fitting of straight lines, Second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, Difference of proportions, single mean, difference of means and difference of standard deviations.

Module 5: Concept of Probability (06 hours)
Probability Mass function, Probability Density Function, Discrete Distribution (Binomial, Poisson's distribution), Continuous Distribution (Normal, Exponential Distribution).
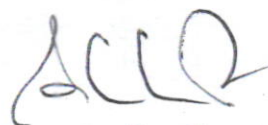
Books References:
1. P. Kandasamy, K.Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 35th Edition, 2010.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. S. Ross, A First Course in Probability, 6th Edition, Pearson Education India 2002.
6. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edition, Wiley 1968. Statistics.

Course Outcomes:

At the end of the course the students will able to:
1. Mathematical tools for Numerical Solution of algebraic and transcendental equations.
2. Estimate the value of function by various interpolation methods.
3. Determine derivative and integrals by numerical methods.
4. Solve the ODE and PDE by finite difference/numerical methods.
5. Apply probability distribution and statistics in various techniques dealing with engineering problems.

Dr. O.P. Chauhan
H.O.D.
Deptt. of App. Mathematics

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Branch- Common to (CE/EE/EC/CSE/IT/IP/AI&DS /MT)
COURSE CONTENTS

w.e.f. July 2023

Subject Code	Subject Name	Maximum Marks Allotted			Total Marks	Hours/Week			Total Credits
		Theory				L	T	P	
CH32	Energy & Environmental Engineering	End Sem	Mid-sem Exam	Quiz/ Assignment					4
		70	20	10	100	3	1	-	

Module 1:

A. **Introduction to Energy Science:**
   World & Indian Energy Scenario, Overview to Energy Systems, Energy sustainability and Environment. Fossil Fuels. Alternatives for fossil fuels: biomass, wind, solar, nuclear, wave, tidal, hydrogen & geothermal energy.

B. **Batteries:**
   Classification of Batteries, Important Applications, Lead-Acid battery, Ni-Cd battery & Li battery. Fuel Cell: Hydrogen-Oxygen Fuel cell.

Module2: Environmental Pollution A:

I. **Air Pollution**
   Causes, Effects & Control Measures of Air Pollution: Primary and Secondary air pollutants and photo-chemical smog. Climate changes, Global warming, Ozone layer depletion. Pollution case studies: Bhopal gas Disaster and London smog Disaster.

II. **Water Pollution**
   Definition, Causes, Effects and Control Measures (Primary & Secondary waste water treatment), Acid Rain and Marine pollution. Pollution case studies: Minamata Tragedy, Ganga Action Plan, Major oil spills of the 20th & 21st century. Water conservation, Rain water harvesting and Water Shed Management.

III. **Noise Pollution**
   Causes, Effects & Control Measures.

Module3: Environmental Pollution B:

I. Sources, Adverse effects and Control measures of Soil Pollution, Thermal Pollution, Nuclear Pollution & Nuclear hazards. Major case studies.

II. Solid waste management: Municipal Solid Waste (MSW), Collection and disposal methods. Disaster Management.

III. Introduction to carbon footprint, ways to reduce carbon footprint, Carbon trading.

Module 4: Ecosystem & Biodiversity:

Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction ,Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: Biodiversity at global & National levels; India as a mega-diversity nation; Hot-spots of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and Endemic species of India; Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity. Environment Protection Act.

Module 5: Corrosion & its prevention:

Theories of Corrosion and Mechanism – Dry (Direct Chemical attack), Wet (Electro Chemical Theory) Atmospheric corrosion, Galvanic Series, Galvanic and Concentration Cell Corrosion, Corrosion by sea water. Factors Influencing and Control of Corrosion – Proper Design, Use of pure metal and metal alloys, passivity, cathodic protection – Sacrificial anode and Impressed Current. Modifying the environment, Use of inhibitors.

Protective coatings:
Hot dipping, Electroplating, Metal spraying metal cladding & cementation.

TEXT BOOKS
1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.
3. A text book of Environmental Chemistry and Pollution control by S.S. Dara & Dr. D. D. Mishra, S. Chand & Co, New Delhi
4. Energy,Environment Ecology and Society by Dr.Pushpendra,Vayu Education of India New Delhi
5. Energy, Environment Ethics and Society, by Dr.S.Deswal & Dr.A.Deswal Dhanpat Rai Publishing Company, New Delhi
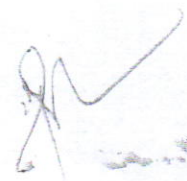
REFERENCE BOOKS
1. J.C. Kuriakose and J. Rajaram, "Chemistry in Engineering and Technology", Vol.1 & 2, Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi
2. Mars G. Fontana, "Corrosion Engineering", Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi.
3. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
4. J.P.Gupta, A Text book of Energy, Environment Ethics & Society" Dhanpat Rai Publishing Company.

COURSE OUTCOME: At the end of the course the student will be able to

CO1	Apply the concept of sustainability of renewable energy to overcome the shortcoming of energy from non-renewable sources. Understanding of Energy devices.
CO2	Develop an understanding related to Water, Air and Noise pollution.
CO3	Understand the importance of Soil, Thermal and Nuclear pollution. Illustrate municipal practices in solid waste management. Define carbon footprints.
CO4	Understand the interrelationship of different species in variety of ecosystems. Conservation of Biodiversity & awareness of Environmental protection Act.
CO5	Recognize the origin as well as types of corrosion and apply appropriate protection mechanism to control corrosion.

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COURSE CONTENTS   w.e.f. July 2023

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/Week			Total Credits
		Theory			Practical						
CE-33	Strength of Materials	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work		L	T	P	
		70	20	10	30	20	150	3	-	2	4

MODULE I:-

Simple Stress and Strains. Concept of Elastic body, stress and Strain, Hooke's law, Concept of stress and strains & their relationships, Fatigue and thermal stresses, Creep. Equilibrium equations, Elastic constants, Stresses in compound bars, composite and tapering bars, 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 and strain, Combined Bending and Torsion, Theories of failure.

MODULE II:-

Bending &Deflection, Theoryof simple bending: Concept of pure bending and bending stress, Equationof 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.

MODULE III:-

Deflection of beams: Double integration Method. Conjugate Beam Method, Macaulay's Method, Area Moment Method, Unit load method : Strain Energy in direct stress, bending and shear. Theory of Plates and Shells, Introduction to theory of elasticity and photo-elasticity.

MODULE IV:-

Torsion of Shafts:Concept of pure torsion, Torsion equation, Determination of shear stress and angle o twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Helical 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' Stresses in thin, thick cylinders and rotating discs.

MODULE V:-

Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Concept of shear flow and shear centre. Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis. Columns and Struts: Euler's buckling load for uniform

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section, various end conditions, slenderness Ratio, Stress V in columns, Rankine formulae, Eccentric loading on columns. Combined Stresses and Bending.

References

1. E,P. Popov, Engineering Mechanics of Solids, 2nd Ed., Prentice Hill, New Delhi, 1999.
2. F.P. Beer, E.R. Johnston and J.T. DeWolf, Mechanics of Materials, 3rd Ed., Tata McGraw Hill, New Delhi, 2004.
3. I.H. Shames and J.M. Pitanesi, Introduction to the Solid Mechanics, 3rd Ed., Prentice Hill, New Delhi, 1989.
4. J.M. Gere, Mechanics of Materials, 5th Ed., Brooks/Cole, Chennai, 2001. S.H. Crandall, N.C. Dhal and T.J. Lardner,
5. Mechanics of Solids: An Introduction, McGraw Hill, Tokyo, 1994. S.M.A. Kazimi, Solid Mechanics,McGraw-Hill, New Delhi, 1981.
6. Nash; Strength of Materials (Schaum), TMH.
7. Ramamrutham; Strength of Materials, ,
8. Subramaniam; Strength of Materials: R; Oxford

LIST OF EXPERIMENTS

1. To determine Tensile strength of steel rod.
2. To determine flexural strength of steel rod.

3. To determine Young's Modulus of Elasticity of different materials of beam simply supported at ends.

4. To determine the Stiffness of the open and closed coil Spring.
5. To determine the deflection of simply supported beam of different materials.
6. To determine Hardness of Mild Steel.
7. Torsion test on steel rod.
8. To determine Impact strength of steel.
9. Compression Test on Cast Iron.
10. Compression Test on Mild Steel.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Explain mechanical properties of steel, different laws of engineering mechanics
CO2	Determine various stresses in symmetrical & unsymmetrical beams, rods, shafts, cylinders & springs.
CO3	Calculate buckling load in columns & deflection in beams by using various methods.

After the completion of this lab student will be able to-

| CO1 | Perform experiments to determine mechanical properties of steel, timber etc. |

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COURSE CONTENTS   w.e.f. July 2023

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
CE-34	Engineering Geology	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	150	L	T	P	4
		70	20	10	30	20		3	-	2	

MODULE I :- Physical Geology

The Earth as a Planet, important parts of the Earth, Action of Atmosphere, Weathering of Rocks, Principles and processes, Engineering significance of weathering, Geologic Action of wind erosion transportation and deposition, Action of River, Ground water and glaciers' Processes and features with all Engineering consideration.

MODULE II :-MINERALOGY&PETROLOGY

Study of Rocks : their origin, composition, classification. Detailed study of important Igneous, Sedimentary, Metamorphic Rocks with Rock cycle.Bowens reaction series, distribution of rocks on Indian sub continent. Civil Engineering importance of Rock forming minerals , Study of Minerals with their importance, hand specimen properties. distribution of some economic minerals on Indian sub continent.
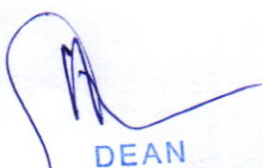
MODULE III:-STRUCTURAL GEOLOGY

Structural features of rocks, Folds, Faults, Joints; Lineaments, Mountains, valleys. terminology, classification, their Engineering properties for Civil Engineering considerations. Earthquakes : Their causes,
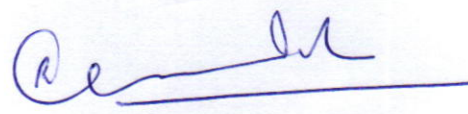
MODULE IV:- REMOTE SENSING, GIS & ITS APPLICATION

Remote Sensing technology, E.M.S., Spectral signatures , its Applications in Civil Engineering, Geographical information system, data base management, use of Remote sensing in G.LS. for soil, rock, site selection purposes.

MODULE V:- APPLIED GEOLOGY

Study of major and minor structures of Civil Engineering like Dam ,Tunnel , Bridges, Culvert, Roads. Their terminolory, classification, different causes for failure, Geological considerations different methods for sub- surface, surface, aerial, satellite investigations for site selection of such structures.

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References :
1. Engineering Geology by Kranine& Jade
2. Engineering Geology by Pravin Singh
3. Physical and Engineering Geolory by S.K.Garg

List of Experiments

1. Identify the given minerals sample for the following :
"HAND SPECIMEN" Mega-scopic Identification on the basis of physical properties
  i.   Rock forming minerals
  ii.Ore forming minerals
  iii. Gangue minerals

2.Identiy the given rock sample for the following : "HAND SPECIMEN" Mega-scopic Identification on the basis of physical properties
i.Igneous rocks
ii.Sedimentary rocks
  iii. Metamorphic rocks

3. Study the given geological maps for the following:
  i. Topography - Configuration of the ground surface with the help of (dotted lines) contours drawn at a regular interval.
  ii. Geologic rock boundaries (dark continuous lines.) superimposed on geographic map.
  iii. Inter relationship of different rock t1ryes with each other i.e. unconformities, sequence etc.
  iv. Structural feature of the rock formations in the form of folds, faults igneous intrusions etc.

4. Use the given geological map for the site selection of a Dam, Bridge, Canal& Tunnel.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate action of natural agencies on various geological formation.
CO2	Categorize various types of rocks and structural formation on earth crust.
CO3	Apply remote sensing technology for site selection of structures such as dams, tunnels, bridges etc. by sub-surface, surface & aerial investigations.

After the completion of this lab student will be able to-

| CO1 | Identify the given sample of minerals and rocks. |
| CO2 | Study geological and geographical maps. |

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COURSE CONTENTS   w.e.f. July 2023

Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Hours/ Week			Total Credits
		Theory			Practical						
	Building Design and Drawing	End Sem	Mid-sem Exam	Quiz/ Assignment	End sem	Lab work	150	L	T	P	4
CE-35		70	20	10	30	20		3	-	2	

MODULE I:-

Components of a building and their functions.Drawing& dimensions of various types of foundations, doors, windows, ventilators, lintels, chhajjas, stairs, trusses.

MODULE II:-

Basics of building planning : Orientation, sun diagram. Principles of building planning viz aspect, prospect, roominess, Grouping, elegance etc, building lay-out.Energy Efficient buildings, principle of architectural composition (i.e. unit, scale, contest etc.)

MODULE III:-

Percentage built up area concept, FAR, open area, set backs, height of buildings, municipal bye laws National building code and its important provisions. Preparation of submission drawing.Basics of colony planning.Fire safety measures.

MODULE IV:-

Planning of residential buildings on different sizes of plots including plan, elevation sectional elevation.drawing to show all dimensions of various components of buildings health buildings.

MODULE V:-

Planning of school & Hostel buildings including drawings selection of site and salient features related to dimensions of each components of these buildings.

References :

1. Building planning, Designing & scheduling by Gurcharan Singh &Jagdish Singh
2.Building Design & Drawing by Shah, Kale &Patki
3.Building Design & Drawing by Malik &Meo.
4. Building Construction by B.C. Punamra
5. Estimating & Costing by B.N. Datta

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List of Experiments
1. Drawing of various types of Shallow foundations.
2. Drawing of various types of Deep foundations.
3. Drawing of various types of foundations door, window, ventilators, stair case
4. Drawing of plan section & elevation of simple four Roomed building
5. Planning & Drawing of residential building
6. Planning & Drawing of simple health building
7. Planning & Drawing of school
8. Planning & Drawing of College Building
9. Planning & Drawing of Hostel
10. Planning & Drawing of Shopping complex.

Course Outcomes-

After the completion of this course student will be able to-

CO1	Illustrate various components of building with drawings.
CO2	Elaborate basics of building planning along with provisions of national building code
CO3	Plan different types of buildings like residential, school and hostel buildings.

After the completion of this lab student will be able to-

CO1	Draw various components of buildings
CO2	Plan different types of buildings.

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