

Ujjain Engineering College, Ujjain (MP) 456010

SYLLABUS FOR FOUR YEARS Bachelor of Technology DEGREE COURSE as per AICTE Model Curriculum

(CE/CM/ME Branches :: July 2019)

Subject Code	Subject Name	Semester	Periods per Week			Scheme of Examination			Total Marks	Credits
			L	T	P	ESE	MST	QAR		
MA 3002	Mathematics – III	III	3	1	0	70	20	10	100	4

Prerequisite: Mathematics – I, Mathematics – II

Course Objective: Introduce students to Laplace transforms, inverse Laplace transforms of different type of functions and principles and use them to solve ordinary and partial differential equations. Also, introduce students to how linear and non linear Partial Differential are formed and solve them by different methods. This course also aims to provide an understanding of the basic concepts in probability, conditional probability and independent events. It will also focus on the random variable, mathematical expectation, and different types of distributions, sampling theory. Another objective of the course is to design a statistical hypothesis about the real world problem and to conduct appropriate test for drawing valid inference about the population characteristics. It is inevitable to have the knowledge of hypothesis testing for any research work. The course will provide an opportunity to learn R programming to substantial extent.

Detailed Course Contents

[Total contact hours required: 60 hours]

Module 1: Laplace Transform (9 lectures, 3 tutorials) [Weightage 14 marks]

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method.

Module 2: Partial Differential Equations (9 lectures, 3 tutorials) [Weightage 14 marks]

First order partial differential equations, Solutions of first order linear and non-linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Second-order linear PDE equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), Separation of variable method, Wave and Heat conduction equations.

Module 3: Basic probability and distributions (9 lectures, 3 tutorials) [Weightage 14 marks]

Probability spaces, conditional probability, independence; Total probability, Baye's theorem, Discrete random variables, Binomial distribution, Poisson distribution, Continuous random variables and their properties, Normal distribution, Evaluation of statistical parameters for these three distributions.

Module 4: Basic Statistics (9 lectures, 3 tutorials) [Weightage 14 marks]

Measures of Central tendency: Moments, Skewness and Kurtosis, Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves. Correlation and Regression, Rank correlation.

Module 5: Applied Statistics (9 lectures, 3 tutorials) [Weightage 14 marks]

Tests of significance: Introduction, Sampling and standard error. Test of significance for large samples: Null and alternate hypothesis, critical region, critical value, and level of significance, confidence interval, Errors in testing of hypothesis. Tests of significance for small samples: Student's t -distribution, Snedecor's F -distribution. Chi-Square distribution: Properties, applications, test for goodness of fit, independence of attributes, test for population variance.

Suggested Text/Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. R. K. Jain, S. R. K. Iyenger, Advanced Engineering Mathematics, Narosa Publications.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
5. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
6. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
7. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

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Table 01: Course Outcomes (COs)

On successful completion of this course students will be able to:

Course Outcome #	Course Outcome
CO1	Find Laplace transform and Inverse Laplace transforms of functions using different methods and able to apply them to solve initial and boundary value problems.
CO2	Classify PDE, solve linear PDEs of both first and second orders, solve nonlinear PDEs of first order and identify real phenomena as models of partial derivative equations (wave and heat equations)
CO3	Understand the concepts of probability, random variables and be familiar with some common probability distribution like Binomial, Poisson and Normal distributions and their properties.
CO4	Understand and apply the concepts of Moments, Skewness and Kurtosis, fit different curves by least square method, understand and apply the concepts of correlation and regressions.
CO5	Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.

Table 02: Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1	-	-	-	-	-	-	-
CO2	3	3	1	2	1	-	-	-	-	-	-	-
CO3	3	3	1	2	1	-	-	-	-	-	-	-
CO4	3	3	1	2	1	-	-	-	-	-	-	-
CO5	3	3	1	2	1	-	-	-	-	-	-	-
MA 3002	3	3	1	2	1	-	-	-	-	-	-	-

Policy for Attendance:

Attendance in lectures and tutorials is compulsory. Please ensure that your attendance is marked on the attendance sheet, and that this is done no later than the first five minutes of the class. There will be maximum 5% marks for attendance which will be awarded as follows:

Attendance	Marks	Attendance	Marks
$\leq 40\%$	1.0	$61\% \leq 80\%$	3.5
$41\% \leq 60\%$	2.5	$81\% \leq 100\%$	5.0

Evaluation Plan:

1. There will be two assignments. Each assignment will carry 1% weightage. Dates, timings and syllabus for Assignment 1 and Assignment 2 will be announced later in the class.
2. There will be two quizzes. Quizzes will be conducted in the tutorial class. Each quiz will be of 30 minutes duration and will carry 1.5% weightage. Dates, timings and syllabus for Quiz 1 and Quiz 2 will be announced later in the class. Questions in Quiz 1 and Quiz 2 will be asked from the tutorial sheets. Missed quizzes cannot be made up.
3. The Mid-Semester examination, will be of 20% weightage. The syllabus for Mid-Sem examination will be announced later in the class. Questions in MSTs may be asked from the tutorial sheets. The End Semester Examination will be of 70% weightage, and will cover all the topics.

THIRD SEMESTER				CIVIL ENGINEERING			
CE3301		COURSE CONTENTS					
CE-3001	Engineering Geology	L	T	P	Max. Marks	Min. Marks	
Duration	3 Hours	3	1	2	70	22	

CE-3001 Engineering Geology

Course objectives

To familiarize the concept of minerals, crystals, rocks and geological time scale, geological work of different physical entities like river, glacier and sea. To classify different types of rocks and geological structures. Application of geology in different fields of civil engineering.

Course Outcomes

- CO1 Outline the geological work of wind, river, glaciers, sea, volcanoes and earthquake.
- CO2 Apply their knowledge in understanding the importance of mineralogy and crystal systems.
- CO3 Classify various rocks based on their formation, structure and texture.
- CO4 Understand the importance of geological entities such as folds, faults, joints and unconformity in civil engineering application.
- CO5 Application of geology in civil engineering for construction of dams, reservoirs, roads, bridges, tunnels and water bearing strata.
- CO6 Understand the application of remote sensing for geological aspects in construction.

UNIT - I

Introduction and General Geology : Objects and branches of geology. Origin of earth, age of earth and internal structure of earth, weathering of rocks, soil, soil formation, soil profile and types of Indian soils. Geological work of wind, geological of river, geological work of glaciers and geological work of sea, volcanoes and earthquake, concept of plate tectonics.

UNIT - II

Mineralogy and Crystallography : Fundamentals of mineralogy, physical properties of minerals and study of common rock forming minerals, ores and minerals of economic importance. Elements of crystal, crystal symmetry and introduction to crystal systems.

UNIT - III

Petrology and Geology of India : Study of igneous, sedimentary and metamorphic rocks, their formation, structures, textures and classification. Descriptive study of rocks. Rocks of civil engineering importance, physical features of India, Brief geological history of India, geological time scale, major geological groups of India and their economic importance.

UNIT - IV

Structural Geology : Structural features of rocks, dip, strike and out croups, classification and detailed studies of geological structures i.e. folds, faults, joints, unconformity and their importance in civil Engineering

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UNIT - V

Applied Geology : Introduction to applied geology and its use in Civil Engineering, Engineering properties of rocks. Selection of sites for construction of Dams, reservoirs, roads, bridges and tunnels, water bearing strata, use of remote sensing technique in selection of above sites.

Laboratory Work :-

- 1 Identification of simple rock forming minerals and important ores, their study and properties.
- 2 Identification of rock, their physical and chemical properties.
- 3 Study of geological maps and their interpretation.
- 4 Folds and their interpretation.
- 5 Faults and their interpretation.
- 6 Unconformities and their interpretation.
- 7 Field visit geological excursion.
- 8 Study of various folds and types of folds.
- 9 Study of various faults and types of faults.

Reference Books :

- 1 Parbin – "Engineering & General Geology".
- 2 P.K. Mukerjee – "A Text Book of Geology".
- 3 S.K. Garg – "A Text Book of Physical and Engineering Geology".
- 4 D. Venkat Reddy – "Engineering Geology".

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Third Semester				Civil Engineering			
CE3302		COURSE CONTENTS					
CE-3002	Strength of materials	L	T	P	Max. Marks	Min. Marks	
Duration	3 Hours	3	1	0	70	22	

Course Objectives

To familiarize the students with the stress, strains developed in the structural members such as beam and columns, methods to obtain shear force, bending moment and deflection under various loading.

Course Content

UNIT - I

Simple Stress and Strains: Concept of elastic body, stress and strain. Hooke's law, various types of stress and strains. Elastic constants. Stresses in compound bars, composite and tapering bars, Temperature stresses.

Complex Stress and Strains: Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal planes, Principal Stresses and strains, Mohr's circle of stresses, Combined Bending and Torsion, Theories of failure.

UNIT - II

Shear Force & Bending Moment: For different types of beams for different loading.

Theory of Simple Bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis. Section-Modulus. Determination of bending stresses in simply supported, cantilever and overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in beams.

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts

UNIT - III

Deflection of beams: Double Integration method, Macaulay method, Area Moment method, Conjugate Beam method and Strain Energy method.,

UNIT - IV

Columns and Struts: Euler's buckling load for uniform section, various end conditions. Slenderness ratio. Stress in columns. Rankine formulae, Eccentric loading on columns.

Combined Direct & Bending Stress: Introduction and middle third rule.

UNIT - V

Static and Kinematics Indeterminacy, Analysis of Fixed and continuous beams by theorem of three moments.

Three hinged arches of different shape,

Reference Books :

- Strength of Materials (Schaum Outlines Series), Nash, Tata McGraw-Hill Pub. Co. Ltd.
- Strength of Materials, Timoshenko, Vol I & II.
- Strength of Materials, B.C. Punmia.
- Strength of Materials, Ramamrutham.

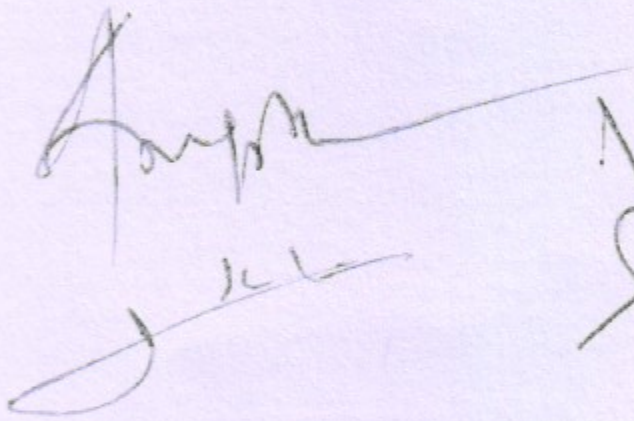
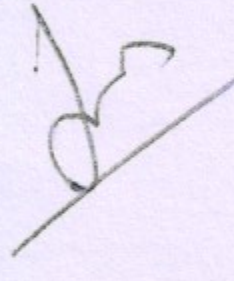
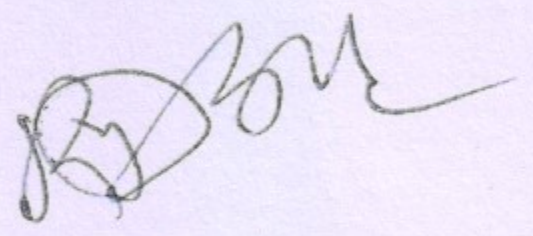
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- Strength of Materials, by R.K. Bansal.
- Strength of Materials by Bhavikatti,
- Strength of Materials by Ryder.
- Theory of structures by B.C. Punmia
- Structural analysis by G.S Pandit, S.P. Gupta

Course Outcomes

After this course the students will be able

- To know the concepts of stresses, strains and Hooke's law and concept of principal stresses and combined stresses.
- To Analyze bending stress and shear stress of the beams and torsion of shafts and evaluate shear force and bending moment and draw the respective diagrams of determinate beams for all types of loading
- To find the deflection and slope for beams using different methods.
- To analyze compression members and concept of buckling and combined stress conditions
- To analyze fixed and continuous beams using method of three moments and analyze three hinge arch



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THIRD SEMESTER				CIVIL ENGINEERING		
CE3303 COURSE CONTENTS						
CE	Building Design & Drawing	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	1	70	22

Course Objectives

- To demonstrate the various the principles of building planning and relevant bye laws adopted in construction.
- To explain the students about the principles of architectural components and fundamentals of energy efficient buildings
- To familiarize the students with different components of building and their types.
- To elaborate the classification of buildings and principles of design adopted in preparation of plans for different types of buildings.
- To demonstrate the development of perspective drawing.

UNIT - I

Principles of planning of building, building bye-laws, Orientation of building, Principle of architectural composition (Mass, Unity, Proportioning, Scale etc.), Energy efficient buildings.

UNIT – II & III

Planning, designing & preparing drawings of residential & public buildings like primary school, office building, primary health center etc.

UNIT - IV

Introduction of foundations, shallow and deep foundation, brick masonry, load bearing cavity and partition wall. Floor, damp proofing, water proofing, of Doors, Windows, Ventilators, Lintels, Staircases, & Roofs etc.

UNIT - V

Provisions of National Building Codes (Lighting, Ventilation, Acoustics, Water Supply etc.), Elements of Perspective drawing involving simple problems.

Sessional Work: -

1. Drawing of Conventional Signs and Symbols Used in Building Drawing.
2. Drawing of Different Types of Foundation and Masonry.
3. Drawing of Different Types of Doors.
4. Drawing of Windows and Ventilators.
5. Drawing of Lintels and Roofs.
6. Drawing of Different Types of Stairs.
7. Planning of Simple Residential Building.
8. Planning of Residential Building For Different Income Groups.
9. Planning of Institutional Building.
10. Planning of Primary Health Centre.
11. Perspective Drawing of Simple Problems.
12. Introduction AutoCAD and basic commands in drawing.
13. Development of plan, elevation and section of building using AutoCAD.

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Reference Books: -

1. Meo & Malik – Elements of Planning of Building Design
2. Y.S. Sane – Planning & Designing Building
3. Gurucharan Singh & Jagadish Singh – Building Planning Designing & Scheduling
4. Sushil Kumar – Building Construction, Standard Book House
5. B.C. Punmia - Building Construction, Laxmi Publications
6. S.P. Bindra & S.P. Arora - Building Construction

Course Outcomes

On the completion of this course the students will be able to:

- CO1 Apply the knowledge of building planning and byelaws in developing the building drawing.
- CO2 To apply the knowledge of architectural compositions and energy efficient building planning
- CO3 To select suitable components based on building requirements and plan as per the norms.
- CO4 To develop: plan, elevation and section for different types of buildings
- CO5 To apply the provisions of National Building Code for planning of services such as lightning, ventilation, water supply, acoustics etc& perspective drawings of simple problems.
- CO6 Utilize Auto Cad software and its commands for drawing & detailing.

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Third Semester					Civil Engineering	
COURSE CONTENTS						
CE3304	Fluid Mechanics	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	70	22

Course Objective:

- Understanding the basic properties of fluids and its pressure measurement
- To understand fluid statics, Archimedes principal and concept of stability of bodies
- Understanding fluid kinematics problems such as streamline and finding fluid particles path
- To use important concepts of continuity equation and Bernoulli's equation
- To study dimensional analysis and perform modelling and similarities studies between model and prototype

UNIT - I

Fluid Properties: Engineering units of measurement, mass, density, specific weight, specific volume, specific gravity, surface tension, capillarity, viscosity, Newtonian, Non Newtonian, Ideal fluid.

Pressure & Its Measurement : Pressure & pressure head, Fluid pressure at a point, Pascal's law, Absolute and gauge pressure, pressure variation in static fluid, Measurement of pressure: manometers, Hydrostatic forces on surfaces: Total pressure & center of pressure on horizontal, vertical, inclined & curved immersed surfaces and gates.

Buoyancy & Flotation: Buoyant force and its center, metacenter and its height, stability of submerged bodies.

UNIT - II

Fluid Kinematics: Description of fluid motions: Lagrangian and Eulerian method, Types of fluid flow, types of flow lines, principles of fluid flow, continuity equation, velocity & acceleration, circulation and vorticity, velocity potential and stream function, flow net, potential flow and its cases.

UNIT - III

Fluid Dynamics : Euler's equation of motion & Bernoulli's equation of motion along a stream line, their derivation and practical application, Pitot and Prandtl tube, Venturimeter, Orifice meter. Linear momentum equation for steady flow, energy correction factor and momentum correction factor, moment of momentum equation, forces on fixed and moving vanes.

Flow measurement: Orifice, Nozzles, Mouth pieces, Weirs & Notches.

UNIT - IV

Dimensional & Model Analysis : Dimensional homogeneity, methods of dimensional analysis – Rayleigh's method, Buckingham's π method, model analysis, simulated, types of similarities,



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types of forces in moving fluid, dimension less numbers, model laws, model testing, classification of models, scale ratio.

UNIT-V

Laminar or Viscous Flow: Introduction of Laminar & Turbulent flow with examples & characteristics, Reynolds experiment, Navier-Stoke equation of motion, relation between shear stress & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Loss of head due to friction in viscous flow.

Pipe flow problems: Loss of head due to friction and minor energy losses, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, equivalent branching of pipes.

Pipe Network: Water Hammer (only quick closure case). Transmission of power. Hardy Cross Method

Course Outcomes:

- CO1 Understand basic properties of fluids, measuring its pressure and stability of floating and submerged bodies
- CO2 Apply the basic concepts of fluid kinematics
- CO3 Apply the concepts of fluid dynamics and measure discharge of fluid flow with instruments like venturimeter, orifice meter, nozzle, mouthpiece and weir-notches.
- CO4 Analyze fluid flow problems and design its model by similarity studies.
- CO5 Interpret the types of flow in pipes and measure various losses in pipes.

List of Experiment:

1. Pressure measurement by different types of manometer.
2. To determine the metacentric height of a floating body
3. To verify the bernoulli's theorm
4. Experiment on pitot tube
5. Experiment on Impact of jet on different types of vanes.
6. Calibration of venturimeter and comparision of coefficient of discharge of venturi meter having different pipe material and diameter.
7. Calibration of orifice meter and comparison of coefficient of discharge of orifice meter having different pipe material and diameter
8. Determination the major losses in a pipe flow and comparison of minor losses in a pipe flow for PVC and GI pipe

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9. Determine the minor losses in a pipe flow Comparison of minor losses in a pipe flow for PVC and GI pipe

Reference Books:

1. Fluid Mechanics by Modi & Seth - Standard Book House, Delhi.
2. Fluid Mechanics and hydraulic machine by K Subramanyam, Mc Graw Hill.
3. Fluid Mechanics by A.K. Jain - Khanna Publishers, Delhi.
4. Fluid Mechanics by Streeter - Mc Graw Hill.
5. Essential of Engineering Hyd. By JNIK DAKE.
6. A Text Book of fluid Mech. for Engg. Student by Franiss JRD

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