

Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)



Evaluation Scheme & Syllabus for
Department Of Civil Engineering
M. Tech-Civil Engineering
(I to IV Semester)
(Effective from session 2019-20)

EVALUATION SCHEME

M.Tech- Civil Engineering

Semester-I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS. (30)	EXT. (70)	SESS. (25)	EXT. (25)	
MTCE-101	Advance Structural Analysis	30	70	NA	NA	100
MTCE-102	Air Pollution, Control, & Environmental Management	30	70	NA	NA	100
MTCE-103	Advance Fluid Mechanics	30	70	NA	NA	100
MTCE-104	Transportation System and Planning	30	70	NA	NA	100
MTCE-105	Research Process & Methodology	30	70	NA	NA	100
MTCE-106	Lab-I	NA	NA	25	25	50
MTCE-107	Lab-II	NA	NA	25	25	50

Semester-II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS. (30)	EXT. (70)	SESS. (25)	EXT. (25)	
MTCE-201	Advance Structural Design	30	70	NA	NA	100
MTCE-202	Advance Foundation Engineering	30	70	NA	NA	100
MTCE-203	Advance Transportation Engineering	30	70	NA	NA	100
MTCE-204	Finite Element Method	30	70	NA	NA	100
MTCE-205	Solid Waste Management	30	70	NA	NA	100
MTCE-206	Lab-III	NA	NA	25	25	50
MTCE-207	Seminar-I	NA	NA	25	25	50

Semester-III

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS. (30)	EXT. (70)	SESS. (25)	EXT. (25)	
MTCE-301	Dissertation phase-I	NA	NA	300	300	600
MTCE-302	Seminar-II	NA	NA	25	25	50
						650

Semester-IV

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT. (70)	SESS. (25)	EXT. (25)	
MTCE-401	Dissertation phase-II	NA	NA	300	300	600
						600

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I Year I Semester

MTCE-101 ADVANCED STRUCTURAL ANALYSIS

Static and kinematic indeterminacies stiffness and flexibility matrices, force & displacement methods, stiffness matrices for prismatic and non- prismatic members, solution techniques, substructure analysis techniques, application to plane and space frame analysis. Organization of computation, programming considerations, applications to practical problems. Techniques of non-linear structural analysis, material and geometrically non- linear problems, incremental and iterative procedures, convergence criteria.

REFERENCES:

1. Dynamics of Structures by Clough & Penzien, McGraw Hill, New york
2. Structural Dynamics by Mario Paz, C.B.S Publishers, New Delhi.
3. Dynamics of Structures by Anil K. Chopra, Pearson Education (Singapore), Delhi.
4. I.S: 1893 - 1984, “Code of practice for Earthquake resistant design of Structures” and latest I.S: 1893 - 2002 (version) Part-1

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I Year I Semester
**MTCE-102 AIR POLLUTION, CONTROL & ENVIRONMENTAL
MANAGEMENT**

Introduction to air pollution; types, sources, effects, and standards of air pollution. Monitoring (sampling & analyses) of common air pollutants. Meteorology and mathematical models related to dispersion & transport of air pollutants, strategies for air pollution control through rational urban planning. Air pollution due to automobiles and its control measures. Engineering control of industrial air pollution: theory & design of particulate control devices theory & design of gaseous pollutants' control devices. Some case studies of industrial emission control. Legal aspects of air pollution. Environmental Acts and Regulations. Environmental impact assessment, Public participation in environment decision making: Prediction and assessment of impact, Legislations in Indian context, Norms & Standards, Principles of sustainable development and implications, Environmental Management Systems.

References

1. Introduction to EIA - JohnGlasson,Taylor and francis.
2. Environment Engineering - P .V Rao, Prentis Hall India Pvt. Ltd.

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I Year I Semester
MTCE 103 -ADVANCED FLUID MECHANICS

Fundamental concepts and scope. Kinematics of fluid motion. Continuity equation, rotational and irrotational motion, circulation, vorticity, velocity potential and stream function, Methods of solving Laplace's equation. Dynamics of ideal fluids, Euler's equation of motion and their integration. viscous Laminar flow, derivation of Navier-stokes equations and their solutions for simple problems. Instability of Laminar flow. Theory of boundary layer, boundary layer approximations, Separation, Turbulent flow. Prandtl's mixing length theory, Von Karman similarity hypothesis. Turbulent flow in smooth and rough pipes, velocity equation, Resistance of smooth and artificially roughened pipes. Flow around submerged objects. Types of drag; drag at high velocities, circulation and circulation theory of lift. Compressible flow. Hydraulic models and model techniques. Electrical analogies applied to hydraulic problems. Wind tunnels. Water tunnels.

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I Year I Semester

MTCE-104 TRANSPORTATION SYSTEM AND PLANNING

Introduction to Transportation systems, Transportation innovations, Social and Economic impacts of Transportation, Decision makers and their options, Demand modeling and prediction, Supply and equilibrium flows, Modelling and transportation technology, Analysis of network flows, Transportation network, Network theory, Concepts in transportation models and location models, Analysis of utility maximizing systems such as entropy Concepts, Major transportation technologies, Cost functions and estimation, Urban transport economic policy, Models for selecting network investments and operation planning, Case Studies.

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I Year I Semester
MTCE105: RESEARCH PROCESS AND METHODOLOGY

UNIT 1:

Introduction to Research and Problem Definition-Meaning, Objective and importance of research, Types of research, steps involved in research, defining research problem

UNIT 2:

Research Design-Research design, Methods of research design, research process and steps involved, Literature Survey

UNIT 3:

Data Collection-Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research

UNIT 4:

Data Analysis and interpretation-Data analysis, Statistical techniques and choosing an appropriate statistical technique, Hypothesis, Hypothesis testing, Data processing software (e.g. SPSS etc.), statistical inference, Interpretation of results

UNIT 5:

Technical Writing and reporting of research-Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Text Books:

1. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques , New Age International publishers, Third Edition.
2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005
3. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition
4. Creswell, John W. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications, 2013.

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***I Year I Semester
MTCE-106 Lab-I***

LIST OF EXPERIMENTS

1. Stress analysis of a plate with a circular hole.
2. Stress analysis of rectangular L bracket
3. Stress analysis of beams (Cantilever, Simply supported, Fixed ends)
4. Mode frequency analysis of a 2 D component
5. Mode frequency analysis of beams (Cantilever, Simply supported, Fixed ends)
6. Program using arrays and functions for matrix manipulation.
7. Programs to draw bending moment and shear force diagrams. Using graphic in C.
8. Analysis of truss using STAAD Pro.
9. Analysis of multistoreyed space frame, using STAAD Pro.
10. Analysis of Bridge deck slab.

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I Year I Semester
MTCE-107 Lab-II

LIST OF EXPERIMENTS

1. Monitoring of ambient air quality for total suspended particulate matter and respirable SPM.
2. Measurement of CO, HC, H₂S and NH₄ in exhausts.
3. Measurements of SO_x and NO_x in ambient air.
4. Study of Arc GIS, Air MOD, SPSS and other statistical software.
5. To determine the chlorine demand and residual chlorine in water.
6. To determine cations (Na, K, Li) and anions (sulfate, nitrate, fluoride).
7. To determine MPN count - total and fecal.
8. To determine the BOD, COD of the given sample.
9. To determine Heavy Metals (Pb, Cr, As, CN, Cd) in waste water.
10. Field visit of Industrial treatment plan and stack monitoring by BIS/EPA methods

From the above list of experiments minimum 8 experiments are required to be done.

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I Year II Semester
MTCE-201 ADVANCE STRUCTURAL DESIGN

Building Frames: Dead, Live, Wind and Earthquake loads, Analysis of framed building by approximate methods for vertical and horizontal loads, Concept of Exact Analysis, Joint detailing.

Liquid Retaining Structures: Basic design philosophy, Analysis and design of single cell rectangular water tanks subjected to hydrostatic loading based on plate theory

Earth Retaining Structures: Basic design philosophy, Calculation of lateral earth pressure based on Rankine's theory. Analysis and design of RC gravity walls, cantilever walls and Counterfort walls. Introduction to soil-structure interaction.

Pre-Stress concrete: Advantages of prestressing, methods of prestressing, losses in prestress, Analysis of simple prestressed rectangular and T- Section

Design of Bridges: Loads, Forces and Permissible Stresses, Code Recommendations regarding design and detailing, Design of slabs under concentrated loads using Effective width and Pigeaud's method, Courbon's method of load distribution, Detailed design of Highway Bridges: RC slab and R.C. T-beam types.

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I Year II Semester
MTCE-202 ADVANCE FOUNDATION ENGINEERING

Bearing capacity: Shallow and deep foundations;

Settlement analysis: Shallow and deep foundations; Different types of foundations and their designs: Raft, Piles, and Well foundation;

Sheet pile walls: Cantilevered and anchored;

Excavation and bracings; Design of retaining walls. Foundations subjected to dynamic loads;

Design of machine foundations.

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MTCE-203 ADVANCE TRANSPORTATION ENGINEERING

Transport policy, processes and surveys. Travel demand forecasting, route assignment analysis, Transport Networks and flow analysis. Classification of systems, Introduction to Intelligent Transportation System (ITS), Public Transport policy, Introduction to BRT, metro projects, concept of Integrated Inter Model transit system. Vehicle costs- operation, running, pollution, travel time, road damage, congestion and accident costs. Various economic studies. Transportation plans –various methods & their comparison. Pavement management systems.- methods and financing, its advantages & limitations. Traffic studies, traffic analysis process, basic traffic theory, intersection studies, parking studies, Traffic generation and parking- surveys, requirements and facilities. Instrumentation of traffic monitoring, Highway pavements and airport pavements, Flexible pavements studies and design as per IRC, Strengthening of pavement – Benkelmen beam method. Concept of rigid pavement and its design as per IRC. Overlay types and their design as per IRC.

References

1. Traffic Engineering and Transport Planning, L.R. Kadiyali, Khanna Publisher.
2. Principles of Transportation Engineering, Chakroborti and Das, PHI Learning Pvt. Ltd.
3. Traffic Engineering - Matson, Smith and Hurd, McGraw-Hill Inc

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I Year II Semester
MTST-204 FINITE ELEMENT METHOD

Introduction to Finite: Element Model-concept of nodes and elements, Formulation of stiffness and transformation matrices,

1-D STRUCTURAL PROBLEMS: Axial bar element – stiffness matrix, load vector, temperature effects, Quadratic shape functions and problems.

ANALYSIS OF TRUSSES: Plane Trusses and Space Truss elements and problems

Implementation details. Basic equations of elasticity Finite element formulations. Isoparametric elements. Formulation of mass and damping matrices. Dynamic equilibrium equation and methods of solution for seismic loading. Accuracy and mesh-locking aspects in plane strain and plane stress analysis.

Brief introduction to Fourier analysis of folded

REFERENCES:

1. The Finite Element Methods in Engineering / SS Rao / Pergamon.
2. Finite Element Methods: Basic Concepts and applications, Alavala, PHI
3. Introduction to Finite Elements in Engineering, Chandrupatla, Ashok and Belegundu, Prentice –Hall

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***I Year II Semester
MTCE-205 SOLID WASTE MANAGEMENT***

Introduction, Overview of Solid Waste Management, Types of Solid Wastes, Sources of Solid Wastes, Properties of Solid Wastes, Solid Waste Generation, On-site Handling, Storage, Collection, Transfer and Transport, Processing Techniques, Ultimate Disposal, Resource and Energy recovery Systems, Biomedical Waste Management, Introduction to Hazardous Waste and Fly Ash Management, Site selection Criteria for Landfill.

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I Year II Semester

MTCE-206 Lab-III

LIST OF EXPERIMENTS

1. Mix design of concrete of different grades & using admixtures.
2. Tensile and Flexural strength of concrete of different grades.
3. Tensile strength of different types of steel rebars, rolled steel sections.
4. Testing of simply supported RCC beams for flexural failure.
5. Testing of simply supported RCC beams for shear failure.
6. Testing of RCC column.
7. Non-destructive testing of concrete including rebound hammer and ultrasonic pulse method.
8. Permeability of concrete.
9. Vibration analysis of beams and plates.
10. Buckling load of struts.