

PEOPLE'S UNIVERSITY, BHOPAL

Programme: M. Tech. (Construction Technology & Management)

Semester -III

Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Advanced Highway Construction	MTCM-301	3	1	-			

Duration of theory (External): 3 hours

Theory Internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Regularity

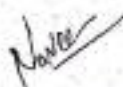
- Max. Marks: 15

- Max. Marks: 15

Unit	Contents (Theory)
I	Earthwork and Soling: Classification of types of highway construction, Suitability of each type under Indian conditions. Selection of base course and surface course. Selection of soils, construction of embankments, excavation and compaction equipments. Field and laboratory tests for quality control. Stone soling, brick soling, current practices. Construction of earth roads, gravel roads, soil stabilised roads, water bound macadam. Paved roads (i) bricks (ii) stones.
II	Bituminous Construction: Properties, requirements and specifications of materials, equipments and plants. Detailed construction procedure of each type. Field and laboratory tests for quality control. Choice of binders under different conditions. IRC, British, and MOST Specifications. Bituminous surface treatments, interface treatments-primecoat, and tackcoat, surface dressing and seal coat, grouted or penetration macadam, bituminous bound macadam, Sheet asphalt, bituminous concrete, mastic asphalt, dense tar surfacing.
III	Cement Concrete Road Construction: Necessity of providing a base course under cement concrete road construction. Selection of materials, constructions methods, detailed construction procedure, Quality control tests (Lab. And Field). Construction equipments, Classification of various types of joints, necessity of providing each type, method of construction of joints, load transfer devices, dowel bars, tie bars, joints filler and sealer materials, IRC Specifications.
IV	Reinforced Cement Concrete Road Construction: Necessity of providing reinforcement in cement concrete pavements, continuously reinforced concrete pavements, prestressed concrete pavements and fibre reinforced concrete pavements. Selection of the mix, compaction method and construction procedure for each type. Recommendations under Indian conditions.
V	Construction Planning and Management : CPM/PERT in Highway Construction.

References:

- 1 Highway Engineering by S. K. Khanna & C.E.G. Justo.
- 2 IRC:37:2012 & IRC:58:2012
- 3 Hand book of MORTH.
- 4 Principles, Practice & Design of Highway Engg. by Dr. S. K. Sharma.




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Programme: M. Tech. (Construction Technology & Management)

Semester -III

Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Bridge Engineering	MTCM - 302	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test
Assignment / Quiz/ Attendance

-Max. Marks: 15

- Max. Marks: 15

Unit	Contents (Theory)
I	Introduction: Definition and components of a bridge, Classification of bridges, Choice of a bridge type. Investigation for Bridges: Need for investigation, Selection of bridge site, Determination of design discharge for river bridge, Linear waterway, Economical span, Vertical clearance, Scour depth, Afflux, Traffic projection.
II	Standard Specifications for Road Bridges: Indian Road Congress Bridge Code, Width of carriageway, Clearances, Loads to be considered; Dead load, I.R.C. standard live loads, Impact effect, Application of Live load on decks, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects, and Seismic force.
III	Reinforced Concrete Bridges: General, Types of bridges; Balanced cantilever bridges, Continuous girder bridges, Rigid frame bridges, Portal Frame and Arch bridges. Detailed design of solid slab and T-beam bridges.
IV	Sub-structure and Foundation: Design of piers and abutments (Masonry & R.C.C.). Types of foundations; Shallow, Pile, and Well foundations including their construction details.
V	Bearings & Appurtenances: Different types of bearings, joints and handrails. Construction and Maintenance of Bridges: Methods of construction of concrete bridges. Causes of Bridge failures, Inspection and maintenance.

References:

1. Essentials of Bridge Engineering by Johnson Victor.
2. A text book of bridge Construction by Khadilkar
3. Bridge Engg. by S. P. Bindra.
4. Concrete Bridge Design SP-23 (ACI Publication)
5. Concrete bridges Handbook by Raina.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Advanced Dam Design and Construction	MTCM - 303	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

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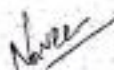
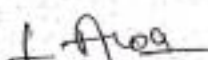
-Max. Marks: 15

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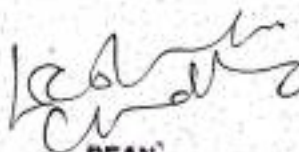
Unit	Contents (Theory)
I	Gravity Dams: River valley projects and their purpose, preliminary investigations and surveys, Selection of site for a reservoir; Types of Dams and their choice. Stability factors, Stresses, Elementary profile, low and high Dams, Forces acting on a Dam. Evolution of the profile of a Dam by Method of Zones, Practical profiles. Design of openings in Gravity Dams, contraction joints. Foundation treatment by Grouting.
II	Spillways: Design of ogee spillway section, Bucket and Energy Dissipation arrangements Design and Details of siphon, Shaft, side channel, and chute spillways, Miscellaneous types of spillways. Design of spillway crests gates and sluice gates, hoisting Machines.
III	Elementary Design of Arch Dams: Definition of an Arch Dam, classification of Arch Dams. Principles of Elastic Theory and applied Trial Load Analysis, Inclined arches, Dome-Dams, Details and Methods of analysis.
IV	Earth Dams: Introduction, Design criteria, against over topping, Control of seepage, Theory of flownets for homogeneous and Zoned embankments. Pore pressure, Stability of slopes, Methods of Analysis, slip circle Method, Protection of slopes, Protection against free passage of water, Rockfill dams.
V	Application of Photo elasticity to the Design of Dams: Use of the Electrical Analogy Method in the Design of Dams, stress computations with embedded Electrical Instruments. River Diversion for construction of Dams, Constructional aspects in the Execution of River Valley projects.

References:

- 1 Advanced Dam Engineering for design construction & Rehabilitation by R. B. Jansen.
- 2 Irrigation & Water Power Engineering by B.C. Purnia.
- 3 Hydrology & Water Resources Engg. by S. K. Garg.
- 4 Irrigation Water Resources & Water Power Engg. by P. N. Modi.
- 5 Theory & Design of Hydraulic Structures by R. S. Varshney & Gupta.



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Semester -III

Subject Title	Subject Code	Credit			Practical		Total (150) Min: 60 (D Grade)
		L	T	P	External (105)	Internal (45)	
Seminar	MTCM - 306	-	-	6			

Practical internal - max marks: 45Lab work & sessional
Assignment / Quiz/ Regularity

- Max. Marks: 40

- Max. Marks: 05

Contents**Elements of Effective Presentation:**

Body Language and use of voice during presentation; Dress, Posture, Gestures, Eye contact and facial expression, Connecting with the audience during presentation; Projecting a positive image while speaking; Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Basics of public speaking; Preparing for a speech.

Stage fright, Voice and language:

Volume, Pitch, Inflection, Speed, Pause Pronunciation; Articulation, Language, Practice of speech.

Use of aids -OHP, LCD Projector, white board.

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Semester -III

Subject Title	Subject Code	Credit			Practical		
		L	T	P	External (105)	Internal (45)	Total (150)
Minor Project	MTCM - 307	-	-	6			Min: 60 (D Grade)

Practical Internal - Max Marks: 45

Lab work & Sessional

Assignment / Quiz/ Regularity

- Max. Marks: 40

- Max. Marks: 05

Contents (Practical)

The Minor Project Work provides students an opportunity to do something on their own and under the supervision of a guide. Each student shall work on an approved project, which should be selected from some real life problem as far as possible, which may involve fabrication, design or investigation of a technical problem. The project work involves sufficient work so that students get acquainted with different aspects of manufacturing, design or analysis. The student also have to keep in mind that in final semester they would be required to implement whatever has been planned in the dissertation in this semester. It is possible that a work, which involves greater efforts and time, may be taken up at this stage and finally completed in final semester, but partial completion report should be submitted in this semester and also evaluated internally. At the end of semester, all students are required to submit a synopsis.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Advanced Foundation Engineering	MTCM - 3101	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Attendance


-Max. Marks: 15

- Max. Marks: 15

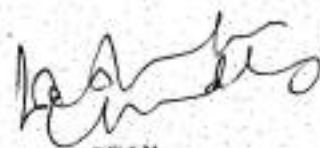
Unit	Contents (Theory)
I	Shallow Foundations: Bearing Capacity, Terzaghis analysis, Computations of bearing capacity factors. Skempton's analysis. Meyerhof's analysis. Balla's theory. Hansen's theory. Design of Shallow Foundations.
II	Pile Foundation: Use of piles, Types of piles, Design of Piles, Group action in cohesive and cohesionless soils. Negative skin friction. Laterally loaded piles. Piles under inclined loads, pile load test, Hrennikoff Method.
III	Engineering with Geosynthetics: Introduction Basic Mechanism of reinforced earth strength characteristics of reinforced soil.
IV	Bridge Substructures: Introduction, elements of bridge substructure, stability analysis of well foundation, design of pier & abutments, sinking of wells.
V	Marine Substructures: Introduction, Types of Marine structures elements, design criteria, design of gravity wall, piled wharf structure breakwaters.

References:

- 1 Soil Mechanics & foundation engg. by V.N.S. Murthy.
- 2 Soil Mech. & foundation engg. by P. Parshotham Raj.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Multi Storey Buildings	MTCM - 3102	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Attendance

-Max. Marks: 15

-Max. Marks: 15

Unit	Contents (Theory)
I	Structural systems and their suitability, structural design criteria in planning.
II	Multistoried Buildings, Preliminary design, Analysis of building frames for vertical and lateral loads by approximate method, Matrix methods for the analysis of building frames & computer programming for the same.
II	Analysis of Shear Walled Buildings Design of sections in reinforced concrete by working stress and limit state methods, Detailing of joints.
IV	Yield line Analysis of reinforced concrete slabs, concept of moment redistribution.
V	Foundation - Superstructure interaction, Earthquake effects and design for ductility.

References:

- 1 Advance R.C.C. design by S. S. Bhavkani.
- 2 Advanced Reinforced Concret design by N. K. Krishna Raju.
- 3 Foundation engg. by P. Varghese.
- 4 Earthquake resistant design of structures by Pankaj Agrawal.
- 5 R. C.C. design by Dr. B. C. Punmia, Ashok & Arun Kumar Jain.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Management of Quality and Safety in Construction	MTCM - 3103	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Attendance

-Max. Marks.: 15

-Max. Marks.: 15

Unit	Contents (Theory)
I	Introduction to quality. Planning and control of quality during design of structures. Quantitative techniques in quality control. Quality assurance during construction. Inspection of materials and machinery. In process inspection and test.
II	Preparation of quality manuals, check-list and inspection report. Establishing quality assurance system. Quality standards/codes in design and construction. Concept and philosophy of total quality management (TQM).
III	Training in quality and quality management systems (ISO-9000). Concept of safety. Factors affecting safety: Physiological, Psychological and Technological. Planning for safety provisions. Structural safety. Safety consideration during construction.
IV	Demolition and during use of equipment. Management of accidents/injuries and provision of first aid. Provisional aspect of safety. Site management with regard to safety recommendations.
V	Training for safety awareness and implementation. Formulation of safety manuals. Safety legislation, standards/codes with regard to construction. Quality vs. Safety. Case Studies.

References:

- Richard J. Coble, Theo C. Haupt, Jimmie Hinz, "The Management of Construction Safety and Health", Taylor & Francis, 2000, 905409328X, 9789058093288
- Abdul Razzak Rumane, "Quality Management in Construction Projects", Taylor & Francis, 2010, ISBN 1439838712, 9781439838716
- Tim Howarth, Paul Watson, "Construction Safety Management", John Wiley & Sons, 2008, ISBN 1405186607, 9781405186605
- Phil Hughes, Ed Ferrett, "Introduction to Health and Safety in Construction: The Handbook for Construction Professionals and Students on Neosh and Other Construction Courses", Edition 3, Publisher Routledge, 2008, ISBN 1856175219, 9781856175210

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Pavement Design and Construction Maintenance	MTCM - 3201	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Attendance

-Max. Marks.: 15

- Max. Marks.: 15

Unit	Contents (Theory)
I	Introduction: Types of pavement structure. Functions of pavement components, Factors affecting pavement design. Design wheel load, Strength characteristics of pavement materials.
II	Design of Flexible Pavements: General design considerations, Methods for design of flexible pavements; Group Index method, California Bearing Ratio (CBR) method, California Resistance Value method, Triaxial Test method, Burmister method, McLeod's method.
III	Design of Rigid Pavements: General design considerations, Methods for design of rigid pavements; Westergard's method, F.A.A. method, IRC recommendations for design of concrete pavements, method, Types of joints and their design in cement concrete pavements. Thickness design for Airport pavement, LCN system of pavement design, design of airport pavement overlays.
IV	Highway Construction: Types of highway construction and their selection, materials for construction, construction procedure of different highways: Earth roads, Gravel roads, WBM roads, Bituminous pavements, Cement concrete pavements, Low cost roads, Introduction to various equipment used for highway construction.
V	Highway Maintenance: Need for highway maintenance, Pavement failures their causes and remedial measures. Typical flexible and rigid pavement failures, Types of highway maintenance: Routine, periodic and special type, materials used for maintenance of different pavements, Strengthening of existing pavements, Maintenance management system.

References:

- 1 Principles of Pavement Design by E.J. Yoder
- 2 Highway Engineering by Khanna and Justo
- 3 Principles, Practice and Design of Highway Engineering by S.K. Sharma
- 4 Handbook of Road Technology by M.G. Lay
- 5 Pavement Analysis and Design by Yang and Hwang
- 6 The Design and Performance of Road Pavements by D. Croyey and P. Croyey
- 7 Planning and Design of Airports by Horenjeff.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100) Min: 40 (D Grade)
Remote Sensing and GIS	MTCM - 3202	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Attendance

-Max. Marks.: 15

-Max. Marks.: 15

Unit	Contents (Theory)
I	Introduction To Remote Sensing: Introduction of Remote Sensing, Electro Magnetic Spectrum - Effects of Atmosphere- Scattering - Absorption-Atmospheric window- Energy interaction with surface features - Spectral reflectance of earth objects and land covers - Resolution concepts - types - Satellites, orbits and missions.
II	Data Acquisition In Different Platforms: Historical development - Opto mechanical electro optical sensors - across track and Along track scanners - multi spectral scanners - characteristics of different types of platforms - medium and high resolution missions - Future Missions - Data products and characteristics - formats
III	GIS Data Input And Data Models: Concepts of Point, Line Polygon / Area, elevation and surface - Concepts of Tessellations Attributes and Levels of Measurement - Data Sources - Ground and Remote Sensing survey - Collateral data collection - Input: Map scanning and digitization, Registration and Geo referencing - Concepts of RDBMS - Raster Data Model - Grid - Data Encoding - Data Compression - Vector Data Model - Topological properties - Arc Node Data Structure - Raster Vs. Vector Comparison - File Formats for Raster and Vector - Data conversion between Raster and vector.
IV	GPS Satellite System: Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.
V	GPS Data Processing & GPS Observations: Code and carrier phase observation - linear combination and derived observables - concept of parameter estimation - downloading the data -data processing - software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

References:

- 1 Edition, Academic Press, 2007, ISBN-13: 978-0123694072
- 2 Gottfried Konecny, Geoinformation: RS, Photogrammetry and Geographic Information Systems, Second Edition, CRC, 2nd edition, 2009, ISBN 0 - 415 23795 - 7.
- 3 Paul R.Wolf, Elements of Photogrammetry, McGraw-Hill Science, 2001, ISBN 0070713464, 9780070713468
- 4 Karl Kraus, Photogrammetry, Fundamentals and standard processes, Dümmler, 2000, ISBN 978 3 11019007 6
- 5 Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 4th edition, 1996
- 6 Satheesh Gopi, rasathishkumar, N.madhu, " Advanced Surveying, Total Station GPS and Remote Sensing " Pearson education , 2007 isbn: 978-81317 00679
- 7 Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

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Subject Title	Subject Code	Credit			Theory		Total (100) Min: 40 (D Grade)
		L	T	P	External (70)	Internal (30)	
Building Cost and Quality Management	MTCM - 3203	3	1	-			

Duration of theory (External): 3 hours

Theory internal - max marks: 30

Best of two mid semester test

Assignment / Quiz/ Attendance

-Max. Marks.: 15

-Max. Marks.: 15

Unit	Contents (Theory)
I	Estimation of quantities for R.C.C. multistoreyed complex viz. earthwork, concrete in foundation, D.P.C., R.C.C. work, flooring and roofing, plastering and pointing etc., wood work, white washing.
II	Analysis of rates for multistoreyed building works - Brick work in foundations and Superstructure, cement concrete, R.C. C., Plastering, Flooring, Timber work etc.
III	Checking of construction quality - various tests for bricks, cement, concrete, aggregates, and steel as per IS codes.
IV	Preparation of bills for payment, measurement book, mode of payment, running account bill. Ledger and Cash book details, Arbitration.
V	Estimation of building services viz. water supply works, electrification, sanitary fitting etc, and their cost analysis.

References:

- 1 Estimating and Costing by B.N. Datta
- 2 Estimating and Costing by G.S. Birdie
- 3 Estimating and Costing by Chakraborty

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