PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2022-23 onwards)

Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
MTTR1201	Highway Traffic Analysis & Design	3	1	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil

Pre, Requisite	Highway engineering.
Course Outcome	1. The student will have an idea of highway capacity and levels of service.
	2. Student will be conversant with elements of design.
	3. The student will be able to plan grade separated intersections

Unit	Contents (Theory)	Marks Weightage
I	**Elements of Traffic Engineering:** Road user, Vehicle and road way. Vehicle characteristics. **IRC standards:** Design speed, Volume. Highway capacity and levels of service, Capacity of urban and rural roads, PCU concept and its limitations. Road user facilities, Parking facilities, Cycle tracks and cycleways, Pedestrian facilities.	14
II	**Traffic Volume Studies:** Origin destination studies, Speed studies, Travel time and delay studies, Parking studies, Accident studies.	14
III	**Elements of Design:** Alignment, Cross sectional elements, Stopping and passing sight distance, Horizontal curves, Vertical curves, Design problems, Hill roads.	14
IV	**Traffic Regulation and Control:** Signs and markings, Traffic system management, Design of grade intersections. Principles of design - Channelisation, Design of rotaries, Traffic signals, Pre-timed and traffic actuated. Design of signal setting, Phase diagrams, timing diagram, Signal co-ordination	14
V	**Grade Separated Intersections**: Geometric elements for divided and access controlled highways and expressways, Road furniture, Street lighting. Traffic Safety, Principles and practices, Road safety audit.	14

Text Book/References Books/ Websites:

1. ITE Hand Book; Highway Engineering Hand Book; Mc Graw Hill.
2. AASHTO A Policy on Geometric Design of Highway and Streets.
3. R. J. Salter and N. B. Hounsel; Highway Traffic Analysis and Design; Macmillan Press Ltd 1996.

Suggested List of Laboratory Experiments : - (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2022-23 onwards)

Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTTR1202	Geographical Information Systems & Remote Sensing	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil

Pre, Requisite	Nil
Course Outcome	1. The student will have an idea of concepts and foundations of remote sensing.
	2. Student will be able to analysis raster data analysis.
	3. The student will be able to know about mapping and monitoring.

Unit	Contents (Theory)	Marks Weightage
I	**GIS Definition:** Map and map analysis, Automated cartography, History and development of GIS, Hardware requirement, Type of data, Spatial and non-spatial data, Data structure, Vector and raster, Files and data formats, Data compression.	14
II	**Spatial Analysis:** Data retrieval, Query, Overlay, Vector data analysis, Raster data analysis, Modelling in GIS, Digital elevation model, DTM, Types of output data, Output devices, Sources of errors, Types of errors, Elimination, Accuracies, The global positioning system and its applications.	14
III	**Concepts and Foundations of Remote Sensing:** Electromagnetic spectrum, EMR interaction with atmosphere, Water vapour, Ozone, Basic principles of photogrammetry, Spectral signature and spectral signature curves, Remote sensing platforms and sensors.	14
IV	**Satellite System Parameters:** Sensor parameters, Earth resources and meteorological satellites, Microwave sensors, Data acquisition and interpretation, Visual image interpretation, Visual image interpretation equipment, Digital image processing, Classification.	14
V	**Applications in Survey:** Mapping and monitoring of land use/land cover, Transportation planning, Infrastructure development, Natural resources management, Urban planning, environment, Coastal zone management, Air quality, Development of resources information systems.	14

Text Book/References Books/ Websites: -

1. P.A. Burrough and A. Rachel McDonell; Principles of Geographical Information Systems; Oxford Publication; 2004.
2. C.P. Lo and Albert K. W. Yeung; Concepts and Techniques of Geographical Information Systems; Prentice Hall India; 2006.
3. Thomas. M. Lillesand and Ralph. W. Kiefer; Remote Sensing and Image Interpretation; John Wiley and Sons; 2003.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External (70)	Internal (30)	Total (100)	External (Nil)	Internal (Nil)	Total
MTTR1203	Ground Improvement Techniques	3	1	-			Min: 40 (D Grade)			(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test- Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment/Quiz/Attendance - Max. Marks: Nil

Pre, Requisite	Nil
Course Outcome	1. The student knows about the knowledge of engineering properties of soil.
	2. Student wills analysis the soil stabilization.
	3. The student will be able to design the soil reinforcement.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Engineering properties of soft, Weak and compressible deposits, Problems associated with weak deposit, Requirements of ground improvements, Introduction to engineering ground modification, Need and objectives.	14
II	**Soil Stabilization:** Science of soil stabilization, Mechanical modification, Hydraulic modification, Dewatering systems, Chemical modification, Modification by admixtures like lime, Cement, Bitumen etc. Grouting, Deep jet mixing methods.	14
III	**Recent Ground Improvement Techniques:** Stabilization using industrial waste, Modification by inclusion and confinement, Soil nailing, Stone column, Compaction piles, Dynamic compaction, Prefabricated vertical drains, Preloading, Electro, Osmosis, Soil freezing vacuum consolidation, Deep explosion, Dry powdered polymers, Enzymes.	14
IV	**Soil reinforcement:** Historical background, RCC, Vidalean concept of reinforced earth, mechanisms, Types of reinforcements, Soil-reinforcement, Interaction studies, Internal & External stability criteria, Design principles of steep reinforced soil slops, Pavements, Embankments on soft soils.	14
V	**Geo-synthetics:** Geo-synthetic clay liner, Construction details, Geo-synthetic materials Functions, Property characterization, Testing methods for geo-synthetics, Recent research and developments. Control of improvement, Field instrumentation, Design and analysis for bearing capacity and settlement of improved deposits.	14

Text Book/References Books/ Websites:

1. M. R. Hausmann; Engineering Principles of Ground Modification; McGraw-Hill International Editions.
2. Raj Purushotham; Ground Improvement Techniques; Laxmi Publications, New Delhi
3. S.K. Sharma; Priniciples practice and Design of Highway Engineering, S.Chand & Co. New Delhi,1985.
4. Jones C. J. F. P, Earth Reinforcement and Soil Structures, Butterworths, London.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTTR202	Pavement Analysis & Design	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment / Quiz - Max. Marks: Nil

Pre, Requisite	Pavement design, Pavement management.
Course Outcome	1. They possess the skill to solve problem in functions of pavement components.
	2. Student will be able to know about by IRC, AASHTO Methods.
	3. Student will apply their knowledge to understand pavement management system.

Unit	Contents (Theory)	Marks Weightage
I	**Introduction:** Types and component parts of pavements, Factors affecting design and performance of pavements. Highway and airport pavements, Functions of pavement components.	14
II	**Pavement Design Factors:** Design wheel load, Strength characteristics of pavement materials, Climatic variations, Traffic, Load equivalence factors and equivalent wheel loads, Aircraft loading, Gear configuration and tyre pressure. Drainage, Estimation of flow, Surface drainage, Sub-surface drainage systems, Design of sub-surface drainage structures.	14
III	**Flexible Pavement Design:** Empirical, Semi-empirical and theoretical approaches, Design of highway and airport pavements by IRC, AASHTO Methods, Applications of pavement design software.	14
IV	**Rigid Pavement Design:** Types of joints and their functions, Joint spacing design of CC pavement for roads, Highways and airports as per IRC, AASHTO, Design of joints, Design of continuously reinforced concrete pavements, Use of software for rigid pavement design.	14
V	**Pavement Management:** Pavement failures, Maintenance of highways, Structural and functional condition evaluation of pavements, Pavement management system.	14

Text Book/References Books/ Websites:-

1. Yoder and Witczak; Priniciples of Pavement Design; John Wiley and Sons.
2. Yang. H. Huang; Pavement Analysis and Design; Second Edition; Prentice Hall Inc.
3. Rajib B. Mallick and Tahar El. Korchi; Pavement Engineering; Principles and Practice; CRC Press.
4. W. Ronald Hudson and Ralph Haas and Zeniswki; Modern Pavement Management; Mc Graw Hill and Co.
5. Relevant IRC Codes.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTTR203	Design & Construction of Rigid Pavements	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment / Quiz - Max. Marks: Nil

Pre, Requisite	IRC, 18, 1981, Standards, Specifications, IRC, 58, 1988, Guidelines for the design of rigid pavements.
Course Outcome	1. The student will have an idea of design of airfield pavements.
	2. Student will apply their knowledge to understand pavement joints.
	3. They will have knowledge in cement concrete mixes.

Unit	Contents (Theory)	Marks Weightage
I	**Theories and Design of Rigid Pavements:** Wastergaurds analysis, Pickets solution, Westergaurd formula for loads on applied area. Finite difference method, Linear elastic layer method. Finite element method, Deflection in rigid pavements. **Design of Concrete Pavements:** ESWL, Stress calculations, Curling stresses, Frictional stresses, Infiltration stresses and load stresses, Slab thickness design, Use of charts and formula for different load positions, Design of airfield pavements.	14
II	**Pavement Joints:** Types of joints, Contraction and warping joints, Dowel bars and tie bars, Temperature reinforcements filling and sealing of joints.	14
III	**Continuously Reinforced Concrete Pavements:** Width and thickness of slab, Reinforcing steel design, Design and construction criteria, Factors affecting, Crack width and spacing of CRC pavements, Design of CRC pavement for highway and airfield.	14
IV	**Design of Prestressed Concrete Pavements:** Stresses in pavements, Thickness design and pre - stressing techniques. **Evaluation and Strengthening:** Performance evaluation safety, Serviceability and durability concepts, Design of overlays on rigid pavements, Fibrous concrete overlays, Economics of rigid pavements, Construction and maintenance.	14
V	**Construction of Rigid Pavements:** Formwork, Mixing, Spreading, Compaction and finishing, Slip form pavers. **Cement Concrete Mixes:** Methods with special reference considering the requirements of pavements, Comparison of different methods.	14

Text Book/References Books/ Websites:-

1. H.M.S.O; Concrete Road; Design and Construction.
2. E. J. Yodar; Principle of Pavement Design.
3. IRC, 18, 1981; Specifications and Code of Practice for Construction of Concrete Roads.
4. IRC, 58, 1988; Guidelines for the design of Rigid Pavements for Highways.
5. IRC SP, 49, 1988; Guidelines for the use of Dry Lean Concrete as Sub Base for Rigid Pavements.

Suggested List of Laboratory Experiments:- (Expandable): Nil

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTTR204	System Analysis & Urban Transportation	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment / Quiz - Max. Marks: Nil

Pre, Requisite	Traffic engineering and Transport planning.
Course Outcome	1. Student will able to know about sampling theory and regression analysis.
	2. They will have knowledge in trip generation models.
	3. Student will able to know about effects of traffic on the environment.

Unit	Contents (Theory)	Marks Weightage
I	**Probability, Statistics For Traffic Engineering Design:** Random variable and statistical measures, Basic concept of probability, Probability-laws, Binomial, Poisson, Normal and Exponential distributions. Sampling theory and regression analysis, General consideration of the accuracy, Cost and time requirements of data collection, Sampling theory and principles for determining sample size and accuracy relationship, Principles of the population mean and standard deviation, Regression analysis examples.	14
II	**Traffic Forecasting:** Principles and techniques, Demand, Price and capacity relationships, Price elasticity, Forecasting for long term demand, Variables, determination of the design hourly volume. Planning methods of transport system planning, Stages of planning, Transportation study area, Collection of travel data, External cordon and screen, Line-survey, Zoning types of surveys.	14
III	**Trip Generation Models:** Introduction and definition, Factors governing trip generation, Multiple linear regression analysis, Aggregated and disaggregated analysis, Category analysis	14
IV	**Distribution Models:** Methods of trip distribution, Growth factor models, Gravity model, Tanner model, Intervening opportunity model, Competing opportunity model. **Assignment Models:** General principle, Assignment techniques, All or nothing Assignment, Multiple route assignment, Capacity restraint assignment, Diversion curves.	14
V	**Economic Analysis:** Need, Costs and Benefits, Time horizon in Economic assignment, Basic principles, Methods of Economic evaluation. Traffic and the Environment, Effects of traffic on the environment.	14

Text Book/References Books/ Websites:-

1. L. R. Kadiyali; Traffic Engineering and Transport Planning.
2. Martine Wool and Brain V. Martin; Traffic System Analysis.
3. B. G. Hutchinson; Principles of UTS Planning; Mc Graw, Hill Publish.
4. M. J. Bruton; Introduction to Transportation Planning.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTTR205	Transportation Planning	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance- Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment / Quiz - Max. Marks: Nil

Pre, Requisite	Transportation engineering.
Course Outcome	1. They will possess the skill to solve problems in Finite Element Method.
	2. Students will have knowledge in descretization of the domain.
	3. Student will be able to know static analysis.

Unit	Contents (Theory)	Marks Weightage
I	**Transportation In Society:** Role of transportation (Land, Air, water) in civilization, Economic, Social, Political, Environmental roles of transportation today in India. **The Fields of Transportation Engineering:** Different fields involved, System planning, Scientific approach to model development science and professional judgment, Organizations. **Component of Transportation System:** Transport technology, Professional systems, Transportation network and their analysis, Vehicle and containers.	14
II	**Vehicle Motion:** Equations of motion, Resistances, Path characteristics, Prediction of vehicle performance, Generalized vehicle performance relationships, Work, Energy and fuel consumptions. **Continuous Flow System:** General characteristics, Belt conveyors, Pipe lines, Concepts of flow and design. **Terminals:** Functions, Analysis, Process flow charts, Terminal processing time, Waiting times, Capacity and level of service concepts simulation probability density functions. Queuing theory, Passenger and fright terminals, Air, Bus, Railroad.	14
III	**Transport costs, Demand And Supply:** Concepts, Types, Future costs and present value, Treatment of inflation, Cost estimating methods, Choice of technology and cost output relationships, Demand function, Demand models, Urban travel for casting model, Demand for freight transportation, Projection techniques, Theory of transport supply, Supply characteristics of transport facilities, Pricing, Supply characteristics of carriers, Supply relationships for an urban transit time. **Transportation Networks Flows:** Merging of demand and supply relationships, Economic market equilibrium and extension to include level of service, Network equilibrium traffic assignment.	14
IV	**Environment Impacts:** Noise impact, Air pollution, Impact on land and value, Vibration, evaluation procedures, Situation in India. **Decision Making:** Characteristics of Transportation problems, Problem solving process, multiple objective evaluation and selection methods, Selection procedures. Economic evaluation methods, Long range transportation planning, Types of Planning process data base alternative and their generation.	14
V	**Operation Plans, System Operation and Management:** Operation plans, Components, Single line analysis, Network relationship, TSM Management scheme for reducing	14

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	congestion in CED and on streets, Reducing travel peaks, Traffic engineering measures, Road traffic models for CBD, Corridor operation planning, Maintenance, Integrated operation planning and design and design of a system, Implementation, Urban transportation legislation, Legal powers, Financing.	

Text Book/References Books/ Websites:-

1. Edward K. Morlok; Introduction to Transportation Engineering an Planning; Mc Graw Hill Book Co.
2. John W. Dickey; Metropolitan Transportation Planning; Mc Graw Hill Co.
3. L.R. Kadiyali; Traffic Engineering and Transportation Planning; Khanna Publication Delhi.
4. Wohl Martin and Brien V. Martin; Traffic System Analysis for Engineers and Planners; Mc Graw Hill Book Co.
5. Bruce D. Hutkiinson; Principles of Urban Transport System Planning; Mc Graw Hill.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total	External	Internal	Total (100)
MTTR206	Advanced Pavement Laboratory	-	-	2	(Nil)	(Nil)	(Nil)	(70)	(30)	Min:40 (D Grade)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks: Nil	Assignment / Quiz Max. Marks: Nil

Pre, Requisite	**Nil**
Course Outcome	1. Able to analyze the properties of cement and do concrete mix design.
	2. Capable of analyzing the strength of soil by conducting CBR test.
	3. Able to test neat and modified bitumen.

Unit	Contents (Theory)	Marks Weightage
I	**Coarse Aggregate:** Gradation, Routhfutch Method, Shape tests, Aggregate impact test, Los angeles abrasion test, Compressive strength of aggregates, Specific gravity test and water absorption test.	100
II	**Bitumen:** Penetration test, ductility test, Softening point test, Flash and fire point test, Viscosity test, Stripping test, Bitumen extraction, Marshall stability mix design analysis.	
III	**Cement Concrete:** Normal consistency test, Specific gravity test on cement, Fineness test cement, Compressive strength of cement, Tests on fresh concrete, Tests on fine aggregates. Cement concrete mix design.	
IV	**Soil:** Basic tests, Gradation, dry and wet, Hydrometer analysis, Atterberg limits, Compaction Test, Specific gravity test, Density, Sand replacement method, Core cutter method, CBR test.	
V	Preparation of feasibility report, DPR.	

Text Book/References Books/ Websites

1. S. K. Khanna and Justo C.G; Highway Engineering; Nem Chand, 1973.
2. A Veeraghavan; Nemchand Bros; Rookee; 2010 Relevant IS and IRC Publication.

Suggested List of Laboratory Experiments :- (Expandable):

1. Aggregate Crushing Value Test.
2. Determination of Aggregate Impact Value.
3. Determination of Los Angeles Abrasion Value.
4. Determination of California Bearing Ratio values.
5. Determination of Penetration value of bitumen.
6. Determination of Viscosity of bituminous material.
7. Determination of Softening Point of bituminous material.
8. Determination of Atterberg limit test.
9. Determination of CBR test

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (50)	External	Internal	Total
MTTR207	CAD in Transportation Engineering	-	-	2	(35)	(15)	Min: 20 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks: Nil	Assignment / Quiz Max. Marks: Nil

Pre, Requisite	**Nil**
Course Outcome	1. Student will understand planning and preparation Mx design.
	2. Student will learn about the civil engineering databases.
	3. Students will able to understand the worksheet calculation in civil engineering.

Unit	Contents (Theory)	Marks Weightage
	Transportation Software: MX Road, REI heads, HDM4, TRIPS, MIGRAN GIS and Remote Sensing, Packages, ArcGIS, Geo-Concept,GRAM++, ENVI, ERDAS Imagine. **Computer Aided Drafting**: DBMS concepts, Civil engineering databases, Data entry & reports. Spreadsheet concepts, Worksheet calculations in civil engineering, Regression & matrix inversion.	**07**

Text Book/References Books/ Websites

1. V. Rajaraman; Computer Oriented Numerical Methods; Prentice; Hall of India, 1995.
2. Chapra S.C., and Canale R.P., Numerical Methods for Engineers, McGraw - Hill, 2004.

Suggested List of Laboratory Experiments :-

- Practicing worksheet calculation in civil engineering database.
- Practicing on spreadsheet concept.
- Practicing on GIS & Remote sensing.

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Programme: **Master of Technology** **Specialization:** Transportation Engineering. **Semester –II**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (50)	External	Internal	Total
MTTR208	Audit Course , II (English For Research Paper Writing)	-	-	-	(35)	(15)	Min: 20 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 2 Hours

Theory Internal- Max Marks: 15	Best of Two Mid Semester Test – Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks: Nil	Assignment / Quiz Max. Marks: Nil

Pre, Requisite	**Nil**
Course Outcome	1. Student will understand planning and preparation.
	2. Student will learn about the skills are needed when writing the methods
	3. Students will able to understand the review of the literature, methods, results, discussion& conclusions.

Unit	Contents (Theory)	Marks Weightage
I	Planning and Preparation, Word Order, Breaking up long sentences, Structuring paragraphs and Sentences, Being concise and removing, redundancy, Avoiding ambiguity and vagueness.	07
II	Clarifying who did what, Highlighting your findings, Hedging and criticizing, Paraphrasing and plagiarism, Sections of a paper, Abstracts, Introduction.	07
III	Review of the literature, Methods, Results, Discussion, Conclusions, The final check.	07
IV	Skills are needed when writing the methods are needed when writing abstract, Key skills are needed when writing an introduction, Skills needed when writing a review of the literature.	07
V	Skills are needed when writing the methods, Skills needed when writing the results, Skills are needed when writing the discussion, Skills are needed when writing the conclusions, Useful phrases, How to ensure paper is as good as it could possibly be the first, Time submission	07

Text Book/References Books/ Websites

1. R. Goldbort (2006); Writing for Science; Yale University Press (available on Google Books).
2. R. Day (2006); How to Write and Publish a Scientific Paper; Cambridge University Press.
3. N Highman; (1998), Handbook of Writing for the Mathematical Sciences; SIAM. Highman's book.
4. Adrian Wallwork; English for Writing Research Papers; Springer New York Dordrecht Heidelberg London, 2011

Suggested List of Laboratory Experiments :- (Expandable): Nil

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PEOPLE'S UNIVERSITY, BHOPAL

(Applicable for Admitted from Academic Session 2022-23 onwards)

Programme: **Master of Technology** **Specialization:** Transportation Engineering **Semester –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
MTTR3101	Industrial Safety	3	1	-	(70)	(30)	Min: 40 (D Grade)	(Nil)	(Nil)	(Nil)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test - Max Marks: 15	Assignment/Quiz/Attendance - Max. Marks: 15
Practical Internal Max Marks: Nil	Lab work & Sessional - Max Marks: Nil	Assignment/Quiz/Attendance- Max. Marks: Nil

Pre-Requisite	Environmental Engineering & Sanitary Engineering
Course Outcome	1. They will have knowledge in industrial safety & fundamentals of maintenance engineering.
	2. Student will understand various concepts of wear and corrosion.
	3. After successfully studying this course student will understand periodic and preventive maintenance.

Unit	Contents (Theory)	Marks Weightage
I	**Industrial Safety:** Accident, Causes, Types, Results and control, Mechanical and electrical hazards, Types, Causes and preventive steps/procedure, Describe salient points of factories act 1948 for health and safety, Wash rooms, Drinking water layouts, Light, Cleanliness, Fire, Guarding, Pressure vessels, etc, Safety color codes, Fire prevention and firefighting, Equipment and methods.	**14**
II	**Fundamentals of Maintenance Engineering:** Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.	**14**
III	**Wear and Corrosion and Their Prevention:** Wear- Types, Causes, Effects, Wear reduction methods, Lubricants-types and applications, Lubrication methods, General sketch, Working and applications of screw down grease cup, Pressure grease gun, Splash lubrication, Gravity lubrication, Wick feed lubrication, Side feed lubrication, Ring lubrication, Definition, Principle and factors affecting the corrosion, Types of corrosion.	**14**
IV	**Fault Tracing:** Fault tracing-concept and importance, Decision tree concept, Need and applications, Sequence of fault finding activities, Show as decision tree, Draw decision tree for problems in machine tools, Hydraulic, Pneumatic, Automotive, Thermal and electrical equipment's like, Any one machine tool	**14**
V	**Periodic and Preventive Maintenance**: Periodic inspection-concept and need, Degreasing, Cleaning and repairing schemes, Overhauling of mechanical components, Overhauling of electrical motor, Common troubles and remedies of electric motor, Repair complexities and its use, Definition, Need, Steps and advantages of preventive maintenance, Steps/procedure for periodic and preventive maintenance of, Machine tools, Pumps.	**14**

Text Book/References Books/ Websites:

1. Higgins & Morrow; Maintenance Engineering Handbook; Da Information Services.
2. H.P. Garg; S. Chand; Maintenance Engineering; S. Chand Publishing.
3. Audels; Pump-hydraulic Compressors; Mcgrew Hill Publication.
4. Winterkorn; Hans; Foundation Engineering Handbook; Chapman & Hall London

Suggested List of Laboratory Experiments :- (Expandable): Nil

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