



**Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur**

Semester I

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Transportation Planning	Course Code: CEPL101	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Transportation Planning Process & Policies: Transportation Planning Process, Components of Transportation Planning, Levels of Planning. Policies of Urban Transportation Planning: National Urban Transport Policy (NUTP), Comprehensive Mobility Plan (CMP), etc. Transportation problems and issues in Indian cities.	8
3	Study Areas and Transportation Surveys: Zoning System, Screen and Cordon Lines and Transportation Network. Sampling techniques, sample sizes. Transportation Planning surveys – Road Inventory Data, Traffic Volume Survey, Origin and Destination Survey, Household surveys, Pedestrian Survey, Parking Survey, Intermediate Public Transport Survey, Goods Survey, etc.	9
4	Four-stage Sequential Planning: Stages of Sequential Planning, Demand Forecasting Techniques. Trip Generation: Types of Trips, Factors Influencing Trip Generation, Models of Trip Generation. Trip Distribution: Growth Factor and Synthetic Models. Modal Split: Factors affecting Modal Split, Types of Modal Split Models. Trip Assignments: Route assignment, Multiple assignment and Network assignment.	12
5	Land use–Transportation Planning: Transport land use relationship, Land-use Transport Models: Early-era models; Intermediate-era model and its derivatives, Modern era models.	6
6	Mobility and Accessibility Consideration in Transport Planning: Definition of Mobility and Accessibility, Case Studies on Mobility and Accessibility. Mobility Consideration for Gender, Disadvantaged Groups, namely: Aged, Children and Poor. Economic Aspects of Transportation Planning: Cost-Benefit Analysis. Basic concepts for carrying out Economic Evaluation. Methods of Economic Evaluation.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Pradip Kumar Sarkar, Vinay Maitri and G. J. Joshi, "Transportation Planning - Principles, Practices and Planning", PHI Learning; 3rd edition 2022
2. S. Ponnuswamy, Dr. (Late) David Johnson Victor, "Urban Transportation: Planning, Operation and Management", McGraw-Hill Education Private Limited, 1st Edition 2012
3. B. G. Hutchinson, "Principles of Urban Transport Systems Planning" Scripta Book Co., Washington – 1974

Reference Books:

1. C A O'Flaherty, ed, "Transport Planning and Traffic Engineering", Butterworth Heinemann, Elsevier, Burlington, MA - 2006
2. C Jotin Khisty and B Kent Lall, "Transportation Engineering – An Introduction", Prentice Hall of India Pvt Ltd., New Delhi -2003
3. Roy Thomas, "Traffic Assignment Techniques", Avebury Technical, Aldershot, England – 1991

Prerequisite:

Basics of Transportation Engineering studied at the B.Tech level.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Pavement Materials and Construction	Course Code: CEPL102	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Soil: Desirable properties and test methods of Soil: grain size analysis (coefficient of uniformity, coefficient of curvature), liquid limit, plastic limit, shrinkage limit, free swell index, unconfined compressive strength, Proctor Test, CBR test. Modulus of subgrade reaction. IS Soil classification system. Aggregates: Desirable properties and test methods of road aggregates: sieve analysis, Impact, Los Angeles Abrasion, Shape, specific gravity, water absorption, soundness test, polish stone value, skid friction coefficient, alkali-aggregate reactivity.	10
3	Bitumen: Bitumen sources and constituents, Desirable properties and tests of paving bitumen (Penetration, Softening Point, Ductility, absolute viscosity, kinematic viscosity, flash & fire point, purity test); Modified bitumen (Elastic recovery, rotational viscosity, storage stability), relevant standard values of highway materials conforming to IS 73 and IS 15462. Bitumen rheology. Different bitumen grading systems. Emulsions: classification and application, Long and short term (Rolling thin film oven) aging of bitumen.	9
4	Bituminous Mixes: Desirable properties of bituminous mix, fillers, determination of mixing and compaction temperature, gradation and blending of aggregates, volumetric properties of bituminous mixes, Stepwise procedure of Job Mix formulae for bituminous mix to select the optimum binder content (OBC) by Marshall Method confirming to MS-2 (sixth edition). Tests on bituminous mixes: stripping value test, Indirect Tensile Strength (ITS), Tensile Strength Ratio (TSR), Retained Stability.	8
5	Road Construction: Bottom to top component layers of flexible pavements, Material specifications & construction methods (as per MoRTH): Subgrade, Granular Sub Base (GSB), Wet Mix Macadam (WMM), Bituminous Mixtures (DBM & BC), Dry Lean Concrete (DLC), and Pavement Quality Concrete (PQC). Sustainable Road Construction: Reclaimed Asphalt Pavement (RAP) material, Hot Mix Recycling (In-Place, and In-Plant), Full Depth Reclamation, plastic roads	9
6	Airport Runway Materials Stabilization techniques and methods for Subgrade, Subbase, and Base course for runway pavement, Comparison of FAA standard layers' specification with MORTH Specification. Pavement Classification Number (PCN) value.	8
Total		45

Text Books:

1. Bituminous Road Construction in India, Prithvi Singh Kandhal, A Veeraragavan, Rajan Choudhary, Second Edition, PHI Publications. Print Book ISBN : 9789391818821
2. Manual Series No. 2 2014, Asphalt Mix Design Methods, Asphalt Institute.
3. Ministry of Road Transport and Highways (MoRTH) 2015.
4. Highway Engineering Revised 10th Edition, S.K. Khanna, CEG Justo, A Veeraragavan, ISBN 8185240930.
5. Airport Engineering By Rangwala, 17th Edition 2019 (First Reprint), ISBN : 9789385039355

Reference Books:

1. Read, J. And Whiteoak, D., "The Shell Bitumen Handbook", Fifth edition, Shell Bitumen, Thomas Telford Publishing, London-2003
2. Relevant IRC and IS codes: IRC SP 112, IRC 120.

Prerequisite:

1. A comprehensive understanding of soil mechanics including soil classification.
2. Proficiency in materials science principles, including understanding the properties and behavior of materials like aggregates, and bitumen.
3. Knowledge of transportation engineering principles, including pavement materials, pavement design methods, and construction techniques.
4. Competence in mathematical and statistical analysis is crucial for understanding mix design principles, analyzing test results, and interpreting specifications for pavement materials like bitumen.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Advanced Concrete Technology	Course Code: CEPL111	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, scope, and outcomes of the course.	1
2	Fundamental of Concrete - constituents, concrete mix design (as per BIS 10262 and IRC-47), transportation, placing and curing, quality control of concrete during construction, effect of superplasticizers	7
3	Supplementary Cementing Materials (SCM): Effect of supplementary cementing materials such as fly ash, ground granulated blast furnace slag, silica fume, rice husk ash, and metakaolin on properties of fresh and hardened concrete; their physical and chemical properties.	5
4	Durability of Concrete – Creep and shrinkage, alkali aggregate reaction, reinforcement corrosion, freezing and thawing, carbonation, chloride ingress, acid and sulphate attack: Factors affecting, effects, mechanisms, prevention and control.	9
5	Special concretes - high strength, low heat of hydration, high early strength, self-compacting, dry lean concrete, pavement quality concrete, fibre reinforced concrete, geopolymers, 3D concrete printing, interlocking paving blocks, White topping, Bonded concrete overlays, roller compacted concrete, pervious concrete pavements, precast concrete pavements for highways and airfield.	9
6	Introduction to the maintenance of concrete structures – techniques for non-destructive evaluations (NDE) of concrete, and evaluation criteria.	7
7	Sustainable Materials: Characterization, Significance, Use of construction & demolition waste, agricultural and industrial wastes, Introduction to sustainable civil infrastructure development and case studies.	7
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Santha Kumar, A.R., (2018), Concrete Technology, Second Edition, Oxford University Press.
2. Shetty, M.S. (2018), Concrete Technology Theory and Practice, Eight Edition, S.Chand and company, New Delhi.
3. Gambhir, M.L., (2017), Concrete Technology, Fifth Edition, Tata McGraw Hill.
4. Neville, (2012), Properties of Concrete, Fifth Edition, Longman Publishers.
5. S.S Bhavikatti, (2015), Concrete Technology, First Edition, I.K International Publishing House Pvt. Ltd.

Reference Books:

1. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
2. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002

Prerequisite:

1. Student should be familiar with general construction materials.
2. Student should have basic knowledge of concrete properties.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Ground Improvement Techniques	Course Code: CEPL112	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Methods of ground improvement: mechanical compaction, dynamic compaction, impact loading, compaction by blasting, vibro-compaction; pre-compression, dynamic consolidation, use of admixtures, injection of grouts, mechanical, cement and chemical stabilization.	10
3	Design aspects of stone columns, design examples on preloading with sand drains, Reinforced earth, basic mechanism, constituent materials and their selection; engineering applications – shallow foundations on reinforced earth, design of reinforced earth retaining walls	12
4	Geosynthetics: Selection and engineering applications, design examples, stabilization/improvement of ground using geomembranes, geocells, geonets, geosynthetic walls, road designs with geosynthetics	8
5	Soil nailing: construction of underground structures, landslide controls, deep vertical cuts, contiguous piles	7
6	Case studies on Problematic soils, improvement of saline soils, and black cotton soils.	7
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. P. Purushothama Raj; Ground Improvement Techniques; Laxmi Publications, Second Edition.
2. Saran, S., "Reinforced Soil and Its Engineering Applications", I.K. international, Second Edition.
3. Shukla, S.K. "An Introduction to Geosynthetic Engineering", CRC Press, First Edition.

Reference Books:

1. Moseley, M. P. and Kirsch K., "Ground Improvement", Spon press, Second Edition.
2. Shukla, S.K., Yin, Jian-Hua, "Fundamentals of Geosynthetic Engineering", Taylor & Francis, First Edition
3. Jones, CJFP, "Earth Reinforcement and soil structure", Thomas Telford, Third Edition.
4. Koerner, R., Designing with Geosynthetics, Prentice Hall, 2005, Sixth Edition.

Prerequisite:

1. Background of Basic Soil Mechanics
2. Geotechnical Engineering and Design

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Environmental Impact and Risk Assessment	Course Code: CEPL113	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs.	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to Environmental Impact Assessment (EIA): Definition and Purpose of EIA, Key Components and Stages of the EIA Process: Scoping, baseline studies, impact prediction, mitigation, reporting, and monitoring, Legal and Regulatory Frameworks for EIA, Overview of EIA laws and guidelines (e.g., NEPA, EU EIA Directive, national regulations), Connectedness: connected spaces and subspaces, Connectedness of the real line, Intermediate value theorem	5
3	Methodologies and Tools for EIA: Baseline Data Collection and Environmental Monitoring, Prediction and Assessment of Impacts, , Socio-economic and Cultural Impacts, Public Involvement in EIA Impact Management - Mitigation & Preparation of Environment Management Plans (EMP)	9
4	Introduction to Risk Assessment: Definition and Types of Risk, Framework and Process of Risk Assessment: Steps in risk assessment including planning, analysis, and decision-making, Hazard Identification and Characterization, Exposure Assessment, Dose-Response Assessment, Risk Characterization, Uncertainty and Variability in Risk Assessment	15
5	Risk Assessment and Mitigation Measures: Qualitative and Quantitative Risk Assessment Methods, Probabilistic Risk Assessment (PRA), Risk Matrices and Risk Ranking, Environmental Risk Assessment Models, Human Health Risk Assessment, Ecological Risk Assessment, Cost-Benefit Analysis in Risk Management, Economic evaluation of risk management options and decision-making	10
6	Case Studies and Practical Applications: Case Studies of EIA in transportation engineering sectors, Analysis of Successful and Unsuccessful EIA Practices, Real-world Risk Assessment Scenarios	5
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Textbooks:

1. Wathern P., "Environmental Impact Assessment: Theory and Practice", Routledge Publishers, 1990
2. Shrivastava A.K., Baxter Nicola, Grimm Jacob, "Environmental Impact Assessment", APH Publishers, 2003
3. Risk Assessment and Risk Management for the Chemical Process Industry" by Stone & Webster Engineering Corporation
4. Environmental Risk Assessment: A Toxicological Approach" by Ted Simon

Reference books:

1. Marriott B., "Environmental Impact Assessment: A Practical Guide", McGraw-Hill Publication, 1997
2. Anjaneyulu Y., Manickam Valli, "Environmental Impact Assessment Methodologies", CRC Press 2011
3. Glasson J., Therivel Riki, Chadwick Andrew, "Introduction to Environmental Impact Assessment", Oxford Brookes University 2012/ 4th edition

Prerequisite:

Basics of Environmental Engineering studied at the B.Tech level.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Geometric Design of Highways	Course Code: CEPL114	Credit: 03
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs.	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Geometric design factors: Highway functional classification, design hourly volume, terrain classification, design speed. Pavement surface characteristics: friction or skid resistance, factors affecting skid resistance, measurement of skid resistance, pavement unevenness, measurement of road roughness, light reflecting characteristics.	6
3	Highway cross-section elements: carriageway or pavement width, traffic lane capacity, cross slope or camber, shape of cross slope, shoulders, medians, guard rails, kerbs, gutters or drainage, footpath or side-walks, formation width, right of way and land width, typical cross-section of roads, IRC recommendations. Sight distances: stopping sight distance, PIEV theory, overtaking sight distance, criteria for sight distance requirements on highways, sight distance at intersections.	8
4	Horizontal alignment – design speed, design of circular curves, super-elevation design, attainment of super-elevation, pavement widening, design of horizontal transition curve, set-back, Numerical problems on horizontal alignment. Vertical alignment - gradients, types of gradient, grade compensation. Design of vertical curves, combination of horizontal and vertical alignment, lateral and vertical clearances at underpasses, IRC recommendations for alignments, coordination of horizontal and vertical alignments, importance of geometric design in road safety.	10
5	Intersection at grade: Various forms of intersection at grade. Parameters of intersection design as per IRC: SP 41: design speed, design traffic volume, radius of curves at intersection, design vehicle, width of turning lanes, auxiliary lanes, visibility at intersections, channelizing islands, capacity of intersections. Rotary intersection: advantages and disadvantages of traffic rotary, design of traffic rotary. Signalized intersections. Grade separated Intersection: functioning of grade separated intersection and interchange ramps, advantages and disadvantages, capacity of different type of intersections. Different type of interchanges, case study of grade separated structures.	10
6	Hill Roads: development of hill roads in India. Geometrics of hill roads: design speed, width of pavement, camber, sight distance, super-elevation, radius of horizontal curve, widening at curves, transition curves, set back distance, hair pin bends, summit curves and valley curves as per IRC recommendations. Drainage works on hill roads: surface drainage systems and sub-surface drainage. Special features connected to hill roads: tunnels, protective works and landslides. Maintenance problems on hill roads: maintenance of drainage structures and snow clear.	10
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Khanna S.K., Justo C.E.G, “Highway Engineering”, Nem Chand & Bros, Roorkee- 2004
2. Sharma S.K., “Principles, Practice and Design of Highway Engineering”, S. Chand and Company Ltd. (Third edition).
3. L R Kadiyali, “Traffic Engineering and Transport Planning”, Khanna Publishers, Delhi – 1999
4. Khisty, C.J. and Lal, B.K., “Transportation Engineering - An Introduction”, Prentice Hall of India Pvt. Ltd. 2006

Reference Books:

1. O’Flaherty, A. Coleman, “Highways: The Location, Design, Construction and Maintenance of Road Pavements”, 4th Ed., Elsevier - 2006
2. Jack ELeishand Associates, ‘Planning and Design Guide: At-Grade Intersections’.Illinios.
3. Relevant IRC publications

Prerequisite:

1. Students should have basic knowledge of mathematics.
2. Students should have basic knowledge of basic principle of mechanics.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Design of Rural Roads	Course Code: CEPL115	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction: Objective, Scope, Outcome of the Course and Prerequisite. Introduction to Rural Road Planning and Development- Importance and role of rural roads in socio-economic development, Characteristics of rural roads, Planning considerations System approach, CRR model, NATPAC model, Gravity model, Deprivity model, FBRNP model, Funding and financing mechanisms for rural road projects.	9
3	Geometric Design of Rural Roads- Design standards and guidelines for rural roads, Horizontal and vertical alignment design, Cross-sectional elements (width, camber, shoulder, etc.), Sight distance considerations and design controls.	8
4	Pavement Design and Construction Techniques- Types of rural road pavements (flexible, rigid, composite), Design considerations for different pavement types, Materials selection and testing for rural road pavements, Construction techniques and quality control measures.	10
5	Drainage and Environmental Considerations- Importance of proper drainage in rural road projects, Types of drainage systems (surface, subsurface, side drains), Design principles for effective drainage, Environmental considerations in rural road construction.	8
6	Pavement failure, Maintenance and Management of Rural Roads- Typical failures of rural roads, Causes of pavement failure, Importance of routine and periodic maintenance, Maintenance techniques for rural roads, Asset management systems for rural road networks, Community participation in road maintenance.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. "Highway Engineering" by S.K. Khanna & C.E.G. Justo
2. "Transportation Engineering: An Introduction" by C.Jotin Khisty, B.K. Lall

Reference Books:

1. Rural Roads Manual , IRC: SP-20
2. Document on Rural Road Development, Vol I & II, CRRI -1990
3. PMGSY Operation Manual, NRRDA, Govt of India -2005
4. Specifications for Rural Roads, MoRD, IRC -2004

Prerequisite:

Students should have basic knowledge of different types and components of roads

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Transportation Infrastructure Design	Course Code: CEPL116	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Railway: Transportation and its development, long-term operative plans for Indian railways. Classification of railway lines and their track standards, railway terminology, tram and tractive resistance, hauling capacity and tractive effort of locomotives, and different types of tractions. Permanent way: Alignment surveys, requirements, gauges, track section, coning of wheels, stress in railway track, high-speed track.	12
3	Design of Railway Components: Gradient, speed, super elevation, cant deficiency, negative super elevation, curves, length of transition curves, grade compensations.	10
4	Airports: Development of air transportation in India, airport site selection, airport obstructions: Zoning laws, imaginary surfaces, approach and turning zone, clear zone, vert. Clearance for highway & railway. Air traffic control: need, network, control aids, instrumental landing systems, Airport Pavement Materials	10
5	Design of Airport Components: Runway and taxiway design: Windrose, cross wind component, runway orientation and configuration, basic runway length and corrections, runway geometric design standards. Taxiway layout and geometric design standards. Exit taxiway and other areas.	10
6	Case studies: Bullet train project, Dedicated Freight Corridor (DFC), vande bharat, metro, mono rail and related to recent advancements in railways and airports.	2
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi, 2003
2. Satish Chandra and Agarwal M.M, "Railway Engineering", 2nd Edition, Oxford University Press, New Delhi, 2013.
3. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012.

Reference Books:

1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
2. Rangwala, "Airport Engineering", Charotar Publishing House, 2013.
3. Airport Engineering Planning and Design by Saxena S.C.

Prerequisite:

1. The students should know the basic components of railways.
2. Basic knowledge about the components of the airport is necessary.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Optimization Techniques	Course Code: NP40.01	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to optimization: Engineering applications of optimization, Mathematical Modeling and simulation, Formulation of structural optimization problems as programming problems. Graphical method.	6
3	Linear Programming: Theory of Simplex Method, Standard form of LPP, feasible solution and basic feasible solution, Improving BFS, Optimality condition, Unbounded solution, Alternative optimal solution, Simplex method, Big M Method, Two phase method.	8
4	Metaheuristics in Optimization: Genetic algorithms, Tabu search, particle swarm intelligence and their applications in Engineering	7
5	PERT & CPM: Objective of CPM & PERT, elements of network, network rules, constraints, error in network, Critical Path Analysis, Activity time and floats, optimization through CPM techniques, PERT and three estimates, critical path analysis of a PERT network, probability of completion of project, controlling and monitoring.	8
6	Non-linear Programming: Local and global minima of one and two variables, constraints optimization, Lagrange's Method, K-T conditions, Steepest descent method, Conjugate gradient method.	10
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. S. S. Rao, Engineering Optimization: Theory and Practice, Wiley, 2008.
2. K. Deb, Optimization for Engineering design algorithms and Examples, Prentice Hall, 2nd edition 2012.

Reference Books:

1. Operations Research, Hira & Gupta,
2. C.J. Ray, Optimum Design of Mechanical Elements , Wiley, 2007.
3. R. Saravanan, Manufacturing Optimization through Intelligent Techniques , Taylor & Francis Publications, 2006.
4. D. E. Goldberg, Genetic algorithms in Search, Optimization, and Machine Learning , Addison-Wesley Longman Publishing, 1989.

Prerequisite:

Basic knowledge of calculus.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Lab Name: Pavement Material Testing Laboratory	Course Code: CEPP130	Credit: 2
Max Marks: 100	CIE: 60	SEE: 40
End Term Exam Time: 2 hrs	Teaching Scheme: LI (60) = 60 hrs. per semester	

Module No.	Tests for Characterization and use of Highway materials
1	To determine the Free Swelling Index of soil.
2	To determine the CBR value of soil.
3	To determine the Unconfined Compression strength (UCS) of soil.
4	To determine aggregate polishing and skid resistance of aggregates.
5	To determine the Penetration value and Softening Point of bitumen.
6	Elastic recovery test for polymer-modified bitumen (PMB).
7	To determine rotational viscosity of polymer modified bitumen (PMB).
8	Formulation of design mixes for sub-base and base courses GSB and WMM.
9	Bituminous Mixes: Proportioning of aggregates, preparation of Marshall test specimens and testing, formulation of bituminous mixes, volumetric analysis, indirect tensile strength and tensile strength ratio, determination of percent bitumen content, and gradation of bituminous mix, recovery of bitumen.
10	Concrete Mix: Proportioning of aggregates, preparation of test specimens and testing, design of dry lean concrete (DLC) and pavement quality concrete (PQC).



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Highway Engineering – S.K. Khanna & C.E.G. Justo. New Chand & Brothers.
2. Asphalt Materials and Mix Design Manual, MS-2, 2014 by Asphalt Institute.

Reference Books:

1. Highway material Testing - S.K. Khanna & C.E.G. Justo.
2. Bituminous Road Construction in India- Kandhal, Prithvi Singh, Veeraragavan, Amirthalingam, Choudhary, Rajan Revised Edition, 2016, PHI Publisher.
3. Ministry of Road Transport and Highways (MoRTH), 2015.

Prerequisite:

1. Understanding foundational concepts in civil engineering, including materials properties, soil mechanics.
2. Basic understanding in geotechnical engineering principles, such as soil classification, compaction, and bearing capacity estimation.
3. Familiarity with basic concepts of pavement engineering.
4. Knowledge of transportation engineering principles.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Transportation Software Lab	Course Code: CEPP131	Credit: 2
Max Marks: 100	CIE: 60	SEE: 40
End Term Exam Time: 2 hrs	Teaching Scheme: LI (60) = 60 hrs. per semester	

Module No.	The experiments include
1	To design and draft the road intersections using CAD software
2	To design and draft road furniture drawings for streets
3	To study delineation of transportation zones, marking of external cordons, internal cordons, screen lines using GIS software
4	To draw transportation maps using GIS software
5	To study and analyse traffic data (volume, speed etc.) using SPSS software and MS-Excel
6	To study traffic simulation and modelling softwares
7	To design flexible pavement using IITPAVE software
8	To design rigid pavement using IITRIGID software



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. "Traffic Simulation and Data: Validation Methods and Applications" by Weitian Tong and Leandros Tassiulas.
2. "Geographic Information Science and Systems" by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind.
3. "AutoCAD and Its Applications Basics 2022" by Terence M. Shumaker, David A. Madsen, and David P. Madsen.
4. "Principles of Pavement Engineering" by Rajib B. Mallick and Tahar El-Korchi.

Reference Books:

1. Relevant IRC and other codes

Prerequisite:

1. Understanding foundational concepts in civil engineering, including materials properties, soil mechanics.
2. Familiarity with basic concepts of pavement engineering.
3. Knowledge of transportation engineering principles.



**Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur**

Semester II

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Pavement Analysis and Design	Course Code: CEPL201	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Component layers of flexible, rigid, semi-rigid, and interlocking block pavements. Flexible Pavements: Functions of component layers: Subgrade, Granular sub-base-cum-drainage layer, Granular Base Course (WMM), Bituminous Binder Course (DBM), Bituminous Surface Course (BC). Functions of Thin Bituminous Surface Course (Pre Mix Carpet for low volume roads).	6
3	Stresses in Flexible Pavements: Vertical stress and deflection in homogeneous mass (Single-layer system), Application of single layer theory in flexible pavement design, Vertical stress and deflection in two-layer elastic system, Application of two layer theory in flexible pavement design, Introduction of three layer elastic system. Effect of superior materials in total thickness of flexible pavements.	8
4	Elements in Design of Flexible Pavements: Traffic characteristics – Traffic volume, growth rate, lane distribution factor, Axle configuration, Equivalent single wheel load for different criteria and Equivalent wheel load factor, Axle load survey, distribution, ESAL and computation of the number of repetitions with numerical examples, Influence of climate in material characteristic functions.	8
5	Design Methods for Flexible Pavements: Design of flexible pavement using IRC 37 guidelines, Evaluation of flexible pavement using falling weight deflectometer (FWD) and design of overlays.	6
6	Rigid Pavements: Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction, stresses due to loads, stresses due to friction, Westergaard's and Thomlinson's analysis of warping stresses due to temperature differential, Combination of stresses due to different causes.	8
7	IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowel Bars. Concept of Continuously Reinforced Concrete Pavement, Design of rigid pavement using IRC 58 guidelines.	8
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Yoder, E.J. and Witczak, M.W., "Principles of Pavement Design 2nd Ed", John Wiley & Sons, Inc. – 1975
2. Highway Engineering by SK Khanna, CEG Justo & A. Veeraragavan (10th Edition); Nem Chand & Bros., Roorkee.
3. C. JotinKhinsty and B. Kent Lall, Transportation Engineering
4. O'Flaherty, A. Coleman, "Highways : the Location, Design, Construction and Maintenance of Road Pavements", 4th Ed., Elsevier - 2006
5. Fwa, T.F., "The Hand Book of Highway Engineering", CRC Press Taylor & Francies Group – 2006

Reference Books:

1. Dr. L.R. Kadiyali, Traffic Engineering and Transportation Planning, Khannan Publishers, 7 th Edition, 2007.
2. Papagiannakis, A.T. and Masad, E.A., "Pavement Design and Materials, John Wiley & Sons Inc - 2008
3. Yang H Huang, 'Design of Functional Pavements', McGraw Hill BookCo.
4. Huang, 'Pavement Analysis', Elsevier Publications.
5. Concrete Pavements, AF Stock, Elsevier, Applied Science Publishers.

Prerequisite:

This is a self-contained course for students and practitioners alike, and hence, no prerequisite is required. For those who do not have an undergraduate degree in civil engineering, familiarity with the construction of bituminous pavements will be helpful.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Traffic Engineering	Course Code: CEPL202	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Traffic Engineering: Elements, issues for traffic engineers, road users, vehicles, highways, and control devices, modeling concepts.	8
3	Traffic Stream Characteristics: Traffic stream parameters, Time Space diagram, relationship among q,k,u, Macroscopic Fundamental Diagrams (MFD).	9
4	Traffic Studies: Traffic volume studies, speed, travel time and delay studies, parking studies, RSI Survey, WTP Survey, accident data collection and analysis, pedestrian studies	9
5	Design concept for intersection & facilities: Concept of capacity and LOS, Operational analysis of two-way and all-way stop controlled intersections and Roundabouts by US and Indian methods, design of parking facilities, types of signals, Design of signals by Indian, US and British methods, signal coordination.	9
6	Management Techniques: Traffic calming; Congestion and road user pricing; priority movements; traffic regulations and control systems; use of intelligent systems.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. William R. Mcshane and Roger P. Roess, "Traffic Engineering", Pearson (4th Edition). 2013
2. Kadiyali, L.R., "Traffic Engineering and Transport Planning", Khanna Publishers. 2012
3. C A O'Flaherty, Ed , "Transport Planning and Traffic Engineering", Butterworth Heinemann, Elsevier, Burlington, MA2006

Reference Books:

1. May, A.D., "Fundamentals of Traffic Flow", Prentice Hall, Inc. 2nd Ed. 1990
2. Carlos F. Daganzo. "Fundamentals of Transportation and Traffic Operations", Pergamon 1997
3. Simon P. Washington, Matthew G. Karlaftis and Fred L. Mannering, "Statistical and Econometric Methods for Transportation Data Analysis", 2nd Edition, CRC Press2011

Prerequisite:

Basics concepts of traffic engineering.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Urban Mass Transportation System	Course Code: CEPL211	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction: Mass transit systems, Elements/components of transit systems; Urban Mass Transit systems- types, characteristics, suitability and adaptability of these systems; Evolution of urban transportation.	6
3	Transit System Planning: Planning needs; Short-range and long-range planning; Planning procedures and methodology, Data collection; Medium performance transit systems and high performance transit systems; trends in transit planning	7
4	Transit Demand Estimation and Evaluation: Transit demand forecasting; transit mode evaluation; comparison and selection of most suitable transit mode.	7
5	Transit System Operations: Basic operational elements; transit travel characteristics; transit scheduling; transit line analysis – planning objectives, geometry, types and their characteristics, capacity of transit lines, system procedures for improving transit line capacity.	7
6	Transit Networks and System Analysis: Transit networks – types and their characteristics; transfers in transit networks; system analysis in transit – conceptual models, modeling procedures; terminal or station location planning – issues, objectives, station spacing decisions.	7
7	Economics and Financing of Transit Systems: Transit system performance and economic measures; transit fares – structure, collection and levels; financing of transit services; public and private integration of transit services.	7
8	Case studies of urban mass transportation systems adopted in India in recent years.	3
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi
2. Jotin Khisty, S.C. and Kent Lall, B., Transportation Engineering – An Introduction, Prentice-Hall, NJ

Reference Books:

1. Hutchison, B.G., Introduction to Transportation Engineering & Planning, McGraw Hill Book Co.
2. Papacostas, C.S., Fundamentals of Transportation System Analysis, PHI
3. Jotin Khisty, C. and Kent Lall, B., Transportation Engineering – An Introduction, Prentice-Hall, NJ

Prerequisite:

1. The students should have basic knowledge of mass transport facilities.
2. Knowledge of surveys conducted for operations of mass transit facilities.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Application of GIS in Transportation Engineering	Course Code: CEPL212	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course.	1
2	Introduction to GIS Definition and scope of GIS, Components of GIS: hardware, software, data, and people, Spatial data types and data models, Coordinate systems and map projections. Spatial Data Acquisition and Processing: Remote sensing techniques for data acquisition, Global Positioning System (GPS) and its applications, Data formats and standards in GIS, Data quality assessment and validation	8
3	GIS Data Analysis Techniques: Spatial analysis methods: buffering, overlay, proximity analysis, Network analysis for transportation routing and optimization, Geo-statistics and interpolation techniques, 3D GIS and terrain analysis.	9
4	Transportation Planning with GIS: Role of GIS in transportation planning and decision-making, Traffic flow analysis and congestion management, Land use-transportation interaction modeling, Transit planning and route optimization using GIS.	9
5	GIS Applications in Transportation Engineering: Highway and road network planning and design, Traffic signal optimization and intelligent transportation systems (ITS), Emergency response and disaster management, Environmental impact assessment in transportation projects.	9
6	Case Studies and Projects: Analysis of real-world transportation problems using GIS, Project-based learning: development of GIS-based transportation solutions, Presentation and discussion of case studies and projects.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. "Geographic Information Systems and Science" by Paul A. Longley, Michael F. Goodchild, David J. Maguire, and David W. Rhind
2. "Geographic Information Systems for Transportation: Principles and Applications" by Harvey J. Miller and Shih-Lung Shaw

Reference Books:

1. Ian Heywood et al., Geographical Information System, Pearson, 2019
2. Bhatta B., Remote Sensing and GIS, Oxford University Press, New Delhi, 2008
3. Lo C.P. and Yeung Albert K.W., Concepts and Techniques of Geographical Information Systems, Prentice-Hall of India Pvt. Ltd. New Delhi, 2006
4. Burrough P.A and McDonnell R.A., Principles of Geographic Information Systems, Oxford University Press, 1998
5. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.

Prerequisite:

Basic knowledge of remote sensing and GIS

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Road Safety Engineering	Course Code: CEPL213	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to Road Safety: Road traffic accidents scenario in India and in world, Road Safety and its importance, Traffic Rules and Driving Behavior, Characteristics of accidents, accidents vs. crash.	9
3	Planning for Road safety: Awareness about rules and regulations of traffic, Assisting Traffic control authorities, Multidisciplinary approach to planning for traffic safety and injury control, Vulnerable Road users: crashes related to pedestrian and bicyclists, their safety, provision for disabled.	9
4	Responsibility of Road accidents and Safety measures: People responsible for accident prevention: Police, Politicians, Community members, Policy makers, Teachers, Parents, Infrastructure authorities, Drivers and Official road safety body, Reasons of students/ children have accidents. Four E's of Accidents Prevention: Engineering, Enforcement, Encouragement, Education - by gaining and using knowledge.	9
5	Road Safety Education: Introduction to Road Safety Education, Five P's of Road safety education: Pre-school road safety education, Practical rather than theory education, Principles of own development as regards to road safety education, Presentations on road safety education, Place for road safety education in syllabus	9
6	Traffic Management Systems: Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Approach to Safety, Road Safety Improvement Strategies, ITS and Safety.	8
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. American Association of State Highway and Transportation Officials (AASHTO), "Highway Safety Manual", 1st Edition, AASHTO. 2010
2. Simon P. Washington, Matthew G. Karlaftis, Fred L. Mannering, "Statistical and Econometric Methods for Transportation Data Analysis", 2nd Edition, Chapman & Hall/CRC Press, 2010
3. Ezra Hauer, "Observational Before -After Studies in Road Safety", Pergamon Press. 1997

Reference Books:

1. Limpert, Rudolf. "Motor Vehicle Accident Reconstruction and Cause Analysis", 5th Edition, Lexus Publishing, Charlottesville, VA. 1999
2. Indian Roads Congress, "Highway Safety Code", IRC: SP-44:1996
3. Indian Roads Congress, "Road Safety Audit Manual", IRC:SP-88-2010

Prerequisite:

This is a self-contained course for students and practitioners alike, and hence, no prerequisite is required. For those who do not have an undergraduate degree in civil engineering, familiarity with the traffic signs will be helpful.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Transportation Economics and Management	Course Code: CEPL214	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Transportation Economics: Definitions and scope of transportation economics, Role of transportation in economic development, Transportation demand and supply analysis. Cost structures in different modes of transportation, Pricing strategies and models, Subsidies and economic regulation. Cost-benefit analysis, Economic impact analysis, Multicriteria decision-making in transportation projects, vehicle operation cost, accident costs and related studies.	12
3	Transportation Planning and Policy: Urban and regional transportation planning, Land use and transportation interaction, Sustainable transportation planning. National and international transportation policies, Transportation funding and financing, Institutional and regulatory framework	8
4	Logistics and Supply Chain Management: Principles of logistics management, supply chain optimization, and role of transportation in logistics.	6
5	Financial Management in Transportation: Financial statements and ratio analysis, Budgeting and financial forecasting, Capital structure and financing. Investment appraisal techniques, Sources of project financing, Public-Private Partnerships (PPP)	9
6	Risk Management: Identification and assessment of risks, Risk mitigation strategies, Case studies in transportation finance & smart transportation solutions, Best practices in sustainable transportation & innovations in transportation management.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. "Transportation Planning and Traffic Engineering" by Dr. L.R. Kadiyali
2. "Principles of Transportation Engineering" by P. Chakroborty and A. Das
3. "Transportation Engineering and Planning" by C.S. Papacostas and P.D. Prevedouros
4. "Principles of Highway Engineering and Traffic Analysis" by Fred L. Mannering and Scott S. Washburn
5. "Introduction to Transportation Systems" by Joseph Sussman

Reference Books:

1. IRC: 9-1972 - Traffic Census on Non-Urban Roads
2. IRC: 64-1990 - Guidelines for Capacity of Roads in Rural Areas
3. IRC: 106-1990 - Guidelines for Capacity of Urban Roads in Plain Areas

Prerequisite:

Basics of Transportation Engineering studied at the B.Tech level.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Pavement Maintenance and Management System	Course Code: CEPL215	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction to Pavement Maintenance and Management System: Objective, Scope, Course Outcomes, Prerequisites for the Course	2
2	Pavement Evaluation and Performance Concepts of Pavement Evaluation, Evaluation of Pavement Performance, Structural Capacity Evaluation, Pavement Distress Evaluation, Pavement Safety Evaluation	5
3	Types of Pavement Distress Structural and Functional Distress, Serviceability, Fatigue Cracking, Pavement Deformation and Behavior, Low Temperature Shrinkage Cracking, Factors Affecting Performance, Relation between Performance and Distress	6
4	Pavement Evaluation Tools and Techniques Functional Parameters (Roughness, Distress, Rutting, etc.), Structural Parameters (Capacity), Equipment: Benkelman Beam, Bump Integrators, Dynaflect, etc., Digital Ultrasonic Concrete Tester, Radiographic and Infrared Testing, Pavement Skid Resistance and Fatigue Testing Equipment, On-site and On-line Testing with Sensors, LVDTs, etc., Preventive Maintenance Strategies, Life-cycle Cost Analysis	8
5	Pavement Overlays Flexible overlays and determination of overlay thickness. Rigid overlays and determination of overlay thickness including thin toppings. Design of Overlay by Benkelman Beam and Falling Weight Deflect meter.	4
6	Design Alternatives and Evaluation Framework for Pavement Design, Design Objectives and Constraints, Basic Structural Response Models, Characterization of Design Inputs, Alternative Pavement Design Strategies, Design using IIT Pave and MEPDG, Economic Evaluation of Design Strategies	10
7	Pavement Management System (PMS) Introduction to PMS and MMS, Construction, Maintenance, and Rehabilitation Strategies, Feedback Data Systems, Case Studies and Real-world Examples, Implementation of PMS, Risk Assessment and Mitigation, Integration of AI, ML, GIS, and Remote Sensing in pavement evaluation, monitoring, and management.	10
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Hass, R., Hudson, W.R. and Zaniewski, J. "Modern Pavement Management" Krieger.-1994
2. Fwa, T.F., "The Hand Book of Highway Engineering", CRC Press, Taylor & Francies Group.-2006
3. Shain, M.Y., "Pavement Management for Airports, Roads and Parking Lots", Kluwer Academic Publishers Group-2004
4. Khanna, S.K. and Justo, C.E.G., "Highway Engineering" Nem Chand & Bros, Roorkee (U.A.) 8th Ed. -2005

Reference Books:

1. Hudson, W.R., Haas, R. and Uddin, W., "Infrastructure Management", McGraw Hill -1997
2. Hass R. & Hudson, W.R., "Pavement Management System", Mc Graw Hill Company, Inc. New York -1978

Prerequisite:

1. Understanding basic concepts of civil engineering, such as materials, and construction methods.
2. Familiarity with fundamental concepts of pavement engineering.
3. Basic understanding in mathematics, particularly in areas such as calculus and algebra.
4. Understanding principles of testing and measurement techniques used in civil engineering.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Non Motorized Transport and Management	Course Code: CEPL216	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to Non-Motorized Transport: Definition and importance of NMT and pedestrian traffic in urban planning and sustainability. Overview of different modes of NMT: walking, cycling, skating, etc. Historical evolution and cultural significance of NMT. Challenges and benefits of promoting NMT in urban areas. Infrastructure and Design for NMT and Pedestrian Safety.	9
3	Principles of urban design for pedestrian-friendly environments: Infrastructure requirements for safe NMT and pedestrian traffic. Design considerations for sidewalks, crosswalks, bike lanes, and shared spaces. Accessibility and inclusivity in NMT infrastructure. Policy and Planning for NMT Integration.	8
4	National and local policies promoting NMT and pedestrian-friendly cities: Planning principles for integrating NMT into transportation networks. Case studies of successful NMT and pedestrian-oriented projects. Stakeholder engagement and community involvement in NMT planning. Safety and Behavior in NMT and Pedestrian Environments.	9
5	Traffic rules and regulations for pedestrians and NMT users: Strategies for improving safety awareness among pedestrians and NMT users. Behavioral factors influencing NMT and pedestrian safety. Public education campaigns and enforcement measures to enhance safety. Promoting Active Transportation and NMT Advocacy	9
6	Health and environmental benefits of active transportation: Strategies for promoting NMT and pedestrian-friendly policies in communities. Role of advocacy groups and grassroots movements in advancing NMT agendas. Technological innovations supporting NMT and pedestrian traffic.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Pradip Kumar Sarkar, Vinay Maitri and G. J. Joshi, "Transportation Planning - Principles, Practices and Planning", PHI Learning; 3rd edition 2022
2. "Street Smart: Street Design for Indian Cities" by Kalanidhi Narayanan, Indian Institute for Human Settlements (IIHS) Press

Reference Books:

1. "Beyond Mobility: Planning Cities for People and Places" by Robert Cervero and Erick Guerra (with an Indian perspective), Island Press
2. C Jotin Khisty and B Kent Lall, "Transportation Engineering – An Introduction", Prentice Hall of India Pvt Ltd., New Delhi -2003
3. Sustainable Urban Mobility Pathways by Oliver Lah, Elsevier

Prerequisite:

Basics of Transportation Engineering studied at the B.Tech level.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Lab Name: Pavement Design and Evaluation Lab	Course Code: CEPP230	Credit: 2
Max Marks: 100	CIE: 60	SEE: 40
End Term Exam Time:	Teaching Scheme: LI (60) = 60 hrs. per semester	

Module No.	Tests for Pavement design and Evaluation
1	To estimate design msa (million standard axle) value for a road
2	To estimate the design CBR value of subgrade.
3	To design flexible pavement using IRC 37 and IITPAVE software.
4	To design longitudinal and transverse joints for rigid pavement.
5	To design dowel and tie bars for rigid pavement.
6	To determine temperature stresses, warping and frictional stresses for rigid pavement.
7	To perform skid resistance value test on a pavement section.
8	To evaluate the existing flexible pavement and to design overlay by falling weight deflectometer.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. Highway Engineering – S.K. Khanna & C.E.G. Justo. New Chand & Brothers.
2. Asphalt Materials and Mix Design Manual, MS-2, 2014 by Asphalt Institute.
3. Pavement Analysis and Design by Yang H. Huang.

Reference Books:

1. Highway material Testing - S.K. Khanna & C.E.G. Justo.
2. Bituminous Road Construction in India- Kandhal, Prithvi Singh, Veeraragavan, Amirthalingam, Choudhary, Rajan Revised Edition, 2016, PHI Publisher.
3. Indian Roads Congress (IRC)-37, 2018, and IRC 58 (2015) specification.

Prerequisite:

1. Understanding foundational concepts in civil engineering, including materials properties, soil mechanics.
2. Basic understanding in geotechnical engineering principles, such as soil classification, compaction, and bearing capacity estimation.
3. Familiarity with basic concepts of pavement engineering.
4. Knowledge of transportation engineering principles.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: II
Course Name: Traffic Studies and Analysis Lab	Course Code: CEPP231	Credit: 2
Max Marks: 100	CIE: 60	SEE: 40
End Term Exam Time: 2hrs.	Teaching Scheme: LI (60) = 60 hrs. per semester.	

Module No.	The experiments includes
1	To determine peak hour factor of a traffic stream.
2	To perform traffic survey and establish Speed-Volume relationship.
3	To design traffic signage and markings as per IRC method.
4	To conduct Parking studies.
5	To identify traffic movement pattern using origin and destination study.
6	To plan and design intersections.
7	To Analysis accident data procured from police stations.
8	To conduct the noise study of traffic.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

1. C.A.O. Flaherty, "Transportation Planning and Traffic Engineering", Butterworth-Heinemann; 4th edition
2. Kadiyali L.R. "Traffic Engineering and Transportation Planning", Khanna Publications
3. IRC, BIS, ISO codes and specifications

Reference Books:

1. McShane, W.R and Roess, R.P, "Traffic Engineering", Prentice-Hall, Inc..Newjersey 1990
2. Relevant IRC Codes, Indian Roads Congress, Delhi
3. Khisty, C.J. and Lall, B.K., "Introduction to Transportation Engineering", Prentice-Hall India

Prerequisite:

1. Different types of traffic studies.
2. Basic of traffic signs and road markings.
3. Knowledge of different types of intersections.



**Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur**

Semester III

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: II	Semester: III
Course Name: Logistics and Freight Management	Course Code: CEPL311	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Logistics and Freight Management: Introduction to Logistics and Supply Chain Management, Evolution and Importance of Freight Management, Key Components of Logistics, Types of Freight Transport (Road, Rail, Air, Sea), Freight Transport Infrastructure and Operations.	8
3	Freight Transport Planning and Operations: Freight Transport Demand Analysis, Freight Route Selection and Network Planning, Scheduling and Routing of Freight, Capacity Planning in Freight Transport, Multi-modal Transport and Intermodal Connections.	9
4	Logistics Strategies and Optimization: Inventory Management and Warehousing, Freight Consolidation and Distribution, Just-In-Time (JIT) Logistics, Freight Cost Optimization Techniques, Risk Management in Freight Operations.	9
5	Freight Transport Economics and Policy: Freight Transport Economics: Cost Structures, Pricing, and Market Structure, Environmental Impact of Freight Transport, Government Policies in Freight Transport, Freight Regulations and Standards, Green logistics and Environmental Sustainability.	9
6	Technology in Freight and Logistics Management: Role of Information Technology (IT) in Freight Management, Advanced Technologies: RFID, GPS, EDI, Freight Management Systems (FMS) and Transportation Management Systems (TMS), Automation in Freight Operations, Big Data, AI, and Blockchain in Freight and Logistics.	9
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Fundamentals of Logistics	Douglas Lambert, James Stock, Lisa Ellram	McGraw-Hill	1998
2.	Transportation Planning: Principles, Practices and Policies	Pradip Kumar Sarkar, Vinay Maitri and G. J. Joshi	Prentice Hall India Learning Private Limited	3 rd (2022)

Reference Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Transport Logistics (Classics in Transport Analysis series)	Alan McKinnon, Kenneth Button, Peter Nijkamp	Edward Elgar Publishing	2002
2.	Freight Transport Management	Bhavya Bhanu, Dr. Priya Srinivasa, K. Rajeswari	Vision Book House	

Prerequisite:

1. Basic Knowledge of Transportation Systems – Understanding transportation modes (road, rail, air, sea) and infrastructure.
2. Principles of Logistics and Supply Chain Management – Familiarity with logistics concepts, inventory, and distribution systems.
3. Introduction to Transportation Economics – Basic understanding of cost analysis, pricing strategies, and economic evaluation in transport.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: II	Semester: III
Course Name: Sustainable Construction Engineering	Course Code: CEPL312	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Sustainability- Introduction, Need and concept of sustainability, Social environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols-Clean Development Mechanism (CDM), Environmental legislations in India-Water Act, Air Act.	12
3	Air Pollution- Effects of Air Pollution; Water pollution-sources, Sustainable wastewater treatment, Solid waste-sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues-Resource degradation, Climate change, Global warming, Ozone layer depletion, and Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon footprint. Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA)-Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA)-Procedures of EIA in India.	14
4	Basic concepts of sustainable habitat, green materials for highway construction, material selection for sustainable design. Sustainable cities, Sustainable transport. Energy sources: Basic concepts-Conventional and nonconventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy, Prefabricated materials in highway construction.	11
5	Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis, Sustainable waste management practices specific to construction sites, Government initiatives for sustainable development.	7
Total		45

Text Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Sustainability Engineering: Concepts, Design and Case Studies	Allen, D. T. and Shonnard, D. R.	Prentice Hall	2011
2.	Engineering applications in sustainable design and development	Bradley, A.S; Adebayo, A.O., Maria, P.	Cengage learning	2015
3.	Systems Analysis for Sustainable Engineering: Theory and Applications	Ni bin Chang	McGraw-Hill Professional	2010
4.	Renewable Energy Resources	Twidell, J. W. and Weir, A. D.	English Language Book Society (ELBS)	3 rd , 2015
5.	Green Technology - An approach for sustainable environment	Purohit, S. S.	Agrobios Publication	2008

Reference Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Environment Impact Assessment Guidelines		Government of India	2006
2.	Basic Concepts in Environmental Management	Mackenthun, K.M.	Lewis Publication	1999
3.	ECBC Code 2007	Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System	TERI Publications	2007

Prerequisite:

Basics of Transportation Engineering studied at the B.Tech. level.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: II	Semester: III
Course Name: Road Asset Management System	Course Code: CEPL313	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course, and Prerequisite. Definition and importance of Road Asset Management Systems (RAMS). Evolution and need for RAM in modern transportation systems, challenges in implementing RAM systems in developing nations.	2
2	Road Asset Inventory and Data Management: Inventory collection methods: Manual, Automated, and Remote Sensing. Components of road assets: pavements, bridges, drainage systems, signage, and road furniture. Data integration using GIS and GPS technologies.	7
3	Performance Evaluation of Road Assets: Key performance indicators: Roughness, Rutting, Cracking, Structural Integrity. Non-destructive testing methods: Benkelman Beam, Falling Weight Deflectometer (FWD), Ultrasonic testing. Pavement condition index (PCI) and Bridge condition index (BCI). Life-cycle cost analysis (LCCA) for performance-based maintenance.	10
4	Decision-Making and Prioritization: Multi-criteria decision analysis (MCDA) for resource allocation, Budgeting and Prioritization techniques for maintenance and rehabilitation planning.	8
5	Maintenance and Rehabilitation Strategies: Maintenance types: Preventive, Corrective, and Emergency. Overlay design: Flexible and Rigid overlays. Strategies for sustainable maintenance of road assets.	10
6	Advanced Technologies in Road Asset Management: Applications of IoT, Artificial Intelligence (AI), and Big Data analytics in real-time monitoring. Smart city initiatives and integration with RAM systems. Case studies of global best practices in road asset management.	8
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Textbooks

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Modern Pavement Management	Hass, R., Hudson, W.R., and Zaniewski, J.	Krieger Publishing Company	1994
2.	The Handbook of Highway Engineering	Fwa, T.F.	CRC Press	2005
3.	Pavement Management for Airports, Roads, and Parking Lots	Shain, M.Y.	Kluwer Academic Publishers Group	2006

Reference Books

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Infrastructure Management	Hudson, W.R., Haas, R., and Uddin, W.	McGraw Hill	1994
2.	Guidelines for Road Maintenance		Ministry of Road Transport and Highways (MoRTH)	
3.	Pavement Management for Airports, Roads, and Parking Lots	Shain, M.Y.	Kluwer Academic Publishers Group	2006

Prerequisite:

The students should have basic knowledge of mass transport facilities.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: II	Semester: III
Course Name: Research Methodology and IPR	Course Code: NP40.02	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Research Methodology: Basic Statistics, Inferential statistics, Central tendency of data, Standard deviation, frequency distribution, level of measurement, Probability distribution, Normal distribution, Correlation, Numerical problems, Introduction to research, Need of research, Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem	8
3	Research Approaches: Approaches of investigation of solutions for research problems, Sample design, data collection, Regression and Z-test, t-test, ANOVA, analysis, interpretation, Necessary instrumentations, Effective literature studies approaches, analysis. Plagiarism, Research ethics, examples	7
4	Effective Technical Writing: Development of Research Proposal, citation of references, Report writing, Precautions for writing research reports	8
5	Nature of Intellectual Property: Patents, Designs, Trademarks, and Copyright, Geographical Indications. Process of Patenting and Development, International Scenario, International Cooperation on Intellectual Property	8
6	Patent Rights: Scope of Patent Rights, Licensing and transfer of technology, patent Infringement and Enforcement. New developments in IPR: IPR of Biological Systems, Computer Software, etc. Case Studies on Intellectual Properties	8
Total		40



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Textbooks

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Research Methodology	C. R. Kothari	New Age Publication	2 nd 2014
2.	Research Methodology- Concept and Cases	Deepak Chawla	Vikas Publications	2 nd 2018
3.	Intellectual Property A Primer for Academia	Dr. Rupinder Tewari and Ms. Mamta Bhardwaj	Honorary Director Publication Bureau, Panjab University Chandigarh	2021

Reference Books

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Research Methodology and Quantitative Methods	Rao G Nageswara	B S Publications	2019
2.	Intellectual Property rights	Ganguli Prabuddha	McGraw Hill Education	2020

Prerequisite:

A basic understanding of research methods including data collection, analysis, and writing research reports, along with foundation knowledge of intellectual property concepts like patents, trademarks, copyrights, and trade secrets.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: I	Semester: I
Course Name: Sustainable Transportation	Course Code: CEPL340.01	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to Sustainable Transportation: Overview of Transportation Systems and Sustainability, The Triple Bottom Line: Environmental, Economic, and Social Dimensions, Key Challenge in Sustainable Transportation	10
3	Environmental Impacts of Transportation: Greenhouse Gas Emissions and Climate Change, Air and Noise Pollution from Transportation, Land Use, Biodiversity, and Habitat Fragmentation	8
4	Public Transit Systems: Role of Public Transit in Sustainability, Innovations in Bus Rapid Transit (BRT), Case Studies: Electric buses, metro systems, and shared mobility solutions.	8
5	Active Transportation and Emerging Technologies in Transportation: Promoting Walking and Cycling, Infrastructure Design for pedestrian facilities and cycling lanes, Case Studies: Bicycle-Friendly Cities, Electric and Hybrid Vehicles, Autonomous and Connected Vehicles, Smart Transportation Systems and IoT.	8
6	Future of Sustainable Transportation: Decarbonizing Transportation, Circular Economy in Transportation, Climate Resilient Transportation Infrastructure	6
7	Global Perspectives: National Urban Transport Policy (NUTP) in India and UN Sustainable Development Goals (SDGs)	4
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Traffic Engineering & Transport Planning	Kadiyali, L.R.	Khanna Publishers, New Delhi	2024
2.	Transportation Engineering – An Introduction	C. Jotin Khisty, B. Kent Lall	Pearson	3 rd , 2017

Reference Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Introduction to Transportation Engineering & Planning	Hutchison, B.G.	Tata McGraw Hill	
2.	Fundamentals of Transportation System Analysis	Papacostas, C.S.	PHI	3 rd

Prerequisite:

3. The students should have basic knowledge of mass transport facilities.
4. Knowledge of surveys conducted for operations of mass transit facilities.

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: II	Semester: III
Course Name: Occupational Health & Safety	Course Code: CEPL340.02	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Introduction to the course: Relevance of OHS in Global Industrial Scenario and impacts on Economy. Job opportunities as Safety Engineers. OSHA Limitations and the Need for Change. Occupational Hazard and Control Principles: Safety, History and development, National Safety Policy. Occupational safety and Health Act (OSHA), Occupational Health and Safety administration - Laws governing OSHA and right to know. Accident – causation, investigation, investigation plan, Methods of acquiring accident facts, Supervisory role in accident investigation. Program Workers' Compensation - Unsafe Acts vs. Unsafe Conditions.	6
3	Ergonomics at Work Place: Ergonomics Task analysis, Preventing Ergonomic Hazards, Work space. Envelops, Visual Ergonomics, Ergonomic Standards, Ergonomic Programs. Hazard cognition and Analysis, Human Error Analysis – Fault Tree Analysis – Emergency Response - Decision for action – purpose and considerations. Indoor Air Quality: Asbestos Awareness - Blood-borne Pathogen	10
4	Fire Prevention and Protection: Fire Triangle, Fire Development and its severity, Effect of Enclosures, early detection of Fire, Classification of fire and Fire Extinguishers. Electrical Safety: Standard and Lockout/Tagout - Product Safety: Technical Requirements of Product safety - Process Safety Management. Exit Routes, Emergency Action Plans and Confined Spaces & Entry	10
5	Health Considerations at Work Place: Types of diseases and their spread, Health Emergency. Principles of Personal Protective Equipment/Clothing, types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability. Forklift Safety/Heat Stress/Ladder Safety /Scaffold Safety.	10
6	Principles of Industrial Hygiene - Occupational Health and Safety Considerations: Water and wastewater treatment plants, Handling of chemical and safety measures in water and wastewater treatment plants and labs, Construction material manufacturing industries like cement plants, RMC Plants, precast plants, and construction sites. Policies, roles and responsibilities of workers, managers, and supervisors. OSHA Record Keeping, Safety training and awareness program	8
Total		45



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Text Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Occupational Safety and Health for Technologists	David L Geotsch	Pearson	8 th , 2014
2.	Industrial Safety, Health and Environment Management Systems	R.K. Jain, Sunil S. Rao	Khanna Publishers	2000
3.	Occupational Safety, Health and Working Conditions Code, 2020		EBC	2025

Reference Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Industrial Safety Management and Technology	Colling D.A.	Prentice Hall	1990
2.	Safety and Environmental Management	Della D.E. and Giustina Van	Government Institutes Inc., U.S.	2 nd , 2007
3.	Safety and Health for Engineers	Roger L. Brauer	Wiley	3 rd , 2016

Standards and Guidelines:

1. ISO 45001 Occupational Health and Safety Management Systems
2. National and regional OHS regulations

Prerequisite:

1. Students should have basic knowledge of civil engineering fundamentals.
2. Students should have basic knowledge of basic principle of safety & Hygiene.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Syllabus

Name of the Programme: M.Tech. in Transportation Engineering	Year: II	Semester: III
Course Name: Project Management	Course Code: CEPL340.03	Credit: 3
Max Marks: 100	CIE: 40	SEE: 60
End Term Exam Time: 3 hrs	Teaching Scheme: CI (45) + TW & SL (45) = 90 hrs. per semester	

Module No.	Contents	Classroom Instruction (CI) Hours
1	Introduction: Objective, Scope, Outcome of the Course and Prerequisite	1
2	Project Initiation: Concepts of projects, characteristics and functions of Project Management, Phases of project life cycle, Tools and techniques for project management, Project in the organization structure, Human factors and the project team, Work break down structure.	9
3	Project Planning: Project feasibility analysis, Estimating project budgets, Project risk management, Quantitative risk assessment methodologies, Critical path method (CPM), Programme evaluation and review technique (PERT), Risk analysis with simulation for scheduling, Gantt Chart, Scheduling with scrum, Crashing a project, Resource levelling.	10
4	Project Execution: Planning-monitoring-controlling cycle, Earned value analysis, Agile tools for tracking project, - Project audit, Essentials of an audit/evaluation, When to close a project Benefits realization, Case study on the success of Chandrayan-3	10
5	Project Time Cost Analysis: Cost time analysis in network planning, updating, Contracts: Introduction, types of contracts and their advantages and disadvantages, Introduction to Indian contract act. Tender: Tender form, Tender Documents, Tender Notice.	10
6	Technological Advancements in Project Management: Advanced Resource and Introduction of Project Management Software, Hybrid Project Management.	5
Total		45

Text Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Project Planning And Control With PERT And CPM	Dr. B. C. Punmia, K. K. Khandelwal	Laxmi Publications	4 th , 2002
2.	Construction Project Management	Kumar Neeraj Jha	Pearson Education	2 nd , 2015
3.	Construction and Project Management	KG Krishnamurthy & SV Ravindra	CBS Publishers	2 nd

Reference Books:

Sr.No.	Title	Author (s)	Publisher	Edition
1.	Construction Project Management Planning (Planning, Scheduling and Controlling)	K. K. Chitkara	Tata McGraw-Hill Education	2 nd , 2010
2.	Construction Planning, Equipment and Methods	R. L. Peurifoy, Clifford J. Schexnayder & Aviad Shapira	Tata McGraw-Hill Education	2 nd , 2005
3.	Project management a system approach to planning scheduling and controlling	Harold Kerzner	Wiley	13 th , 2022

Prerequisite:

1. The students should have basic knowledge of mass transport facilities.
2. Knowledge of surveys conducted for operations of mass transit facilities.