MASTER OF PLANNING (TRANSPORT PLANNING)

SCHEME OF EXAMINATION

1st YEAR - SEMESTER II												
Classification of Course	Code	Course	Hours/ Week	L	T	S	Credits	External Exam Type	Marks			Duration of (Theory) Exam
									Internal Assessment	External Examination	Total	
Core	TP 2.01	Urban Transport Planning	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 2.02	Traffic Engineering	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 2.03	Public Transport Planning	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 2.04	Transport Economics	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
Studio	TP 2.05	Design Studio	10	0	0	10	10	Jury*	200	250	450	**
	TP 2.06	Traffic Laboratory and Software Application	2	0	0	2	2	Internal Only*	50	0	50	**
Department Elective	TP 2.07	Highway Planning and Design	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 2.08	Road Safety & Environment										
TOTAL			22				22		500	500	1000	

List of Abbreviations

L = Lecture; T = Tutorial/ Seminar/ Research/ Lab; S = Studio

* Studio/dissertation external & internal exam is in one or combination of different examination mode like viva-voce/ written test/ assignment/ project model building/ Jury/ seminar/ presentation (electronic or paper based)

**Duration of exam of individual or whole class is decided by examiner concern, jury members, studio co-ordinator or subject co-ordinator or HOD or Dean (Academic).

***Teaching method may be one of or combination of different mode like Lectures(L)/ Seminar(S)/ Tutorial(T)/ Workshop(W)/ Research(R)/ Laboratory (Lab)

2nd YEAR - SEMESTER III									Marks			
Classification of Course	Code	Course	Hours/ Week	L	T	S	Credits	External Exam Type	Internal Assessment	External Examination	Total	Duration of (Theory) Exam
Core	TP 3.01	Intelligent Transport System	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 3.02	Logistics and Urban Freight	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 3.03	Transport Infrastructure Design	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
Studio	TP 3.04	Design Studio	9	0	0	9	9	Jury*	150	250	400	**
	TP 3.05	Formulation of Thesis Research Topic and Literature Review	1	0	0	1	1	Internal Only*	50	0	50	**
	TP 3.06	Applied Quantitative Techniques and Software Applications	2	0	0	2	2	Internal Only*	50	0	50	**
Department Elective	TP 3.07	Engineering Economics	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 3.08	Analytical Transport Planning										
Institute Elective	TP 3.09	Public Transport and City Development	2	2	0	0	2	Internal Only*	100	0	100	**
TOTAL			**22**				**22**		**550**	**450**	**1000**	

List of Abbreviations

L = Lecture; T = Tutorial/ Seminar/ Research/ Lab; S = Studio

* Studio/ dissertation external & internal exam is in one or combination of different examination mode like viva-voce/written test/ assignment/ project model building/ Jury/ seminar/ presentation (electronic or paper based)

**Duration of exam of individual or whole class is decided by examiner concern, jury members, studio co-ordinator or subject co-ordinator or HOD or Dean (Academic).

***Teaching method may be one of or combination of different mode like Lectures(L)/Seminar(S)/Tutorial(T)/workshop(W)/Research(R)/Laboratory (Lab)

2nd YEAR - SEMESTER IV									Marks			
Classification of Course	Code	Course	Hours/ Week	L	T	S	Credits	External Exam Type	Internal Assessment	External Examination	Total	Duration of (Theory) Exam
Core	TP 4.01	Transport Policy, Legislation and Institutional Framework	2	2	0	0	2	Written-Exam	50	50	100	2 hrs.
	TP 4.02	Thesis	12	0	0	12	12	Jury*	400	400	800	**
Institute Elective	TP 4.03	Planning and Design for Universal Accessibility	2	2	0	0	2	Internal Only*	100	0	100	**
TOTAL			**16**				**16**		**550**	**450**	**1000**	
GRAND TOTAL OF ALL SEMESTERS			**86**				**84**		**2150**	**1850**	**4000**	

List of Abbreviations

L = Lecture; T = Tutorial/ Seminar/ Research/ Lab; S = Studio

* Studio/dissertation external & internal exam is in one or combination of different examination mode like viva-voce/written test/ assignment/ project model building/ Jury/ seminar/ presentation (electronic or paper based)

**Duration of exam of individual or whole class is decided by examiner concern, jury members, studio co-ordinator or subject co-ordinator or HOD or Dean (Academic).

***Teaching method may be one of or combination of different mode like Lectures(L)/Seminar(S)/Tutorial(T)/workshop(W)/Research(R)/Laboratory (Lab)

SYLLABUS

FIRST YEAR: SEMESTER II

TP2.01: Urban Transport Planning

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1: Urbanization and Urban Transport

- Urbanisation trends, urban transport system across city typology; Impact of urbanisation on urban transportation; Mobility issues.
- Definition, concepts, scope and utility of traffic engineering. Road users and behaviour. relationship between the traffic flow variables, fundamental diagrams of traffic flow, Shockwave Analysis.

Module 2: Urban Transport and Land Use

- Urban forms and structure, impact on travel pattern, land use transport cycle, and its impact on land use, land use- transport model.

Module 3: Transport Planning Process

- Urban transport planning process; study area delineation, zoning; data needs; analytical outputs and their use.

Module 4: Transport Demand Modelling

Aggregate demand modelling approach- trip generation models, trip distribution models and its calibration, modal split models and its calibration, traffic assignment techniques; calibration and validation checks; disaggregate travel demand models- disaggregate choice models, concepts of value of time and generalized cost; modelling inter- city travel demand; freight generation models.

Module 5: Urban Transport Policies

- Urban transport policies and issues related to sustainability; strategies for urban transport improvement; international best practices.

Module 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.

TP2.02: Traffic Engineering

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1: Introduction to Traffic Engineering & Traffic Flow Theory Principles

- Definition, concepts, scope and utility of traffic engineering. Road users and behaviour. relationship between the traffic flow variables, fundamental diagrams of traffic flow, Shockwave Analysis.

Module 2: Design of Road Infrastructure

- Road cross-sectional elements- right of way, carriageway, median, service lane, footpath, curb, camber, side slope, service road etc. for different hierarchy of roads; geometry of horizontal curves and vertical curves, super elevation, sight distance, access control etc., crash barriers / cushions.

Module 3: Capacity of Urban & Non-Urban Roads

- Definition of capacity and level of service, factors affecting capacity and level of service, static and dynamic PCU, (*Passenger Car Unit) Design service volume, capacity norms for urban roads, intercity and highways.

Module 4: Design of Intersections

- Types of intersections, visibility, Design principles – alignment and vertical profile, visibility, radii of curves, channelization; roundabouts- capacity and design; capacity of signalized intersection; Grade separated intersection design elements- ramp gradient, acceleration and deceleration lanes, weaving sections, etc.

Module 5: Traffic Signal Control and Regulation

- Introduction to traffic signals, warrant for signals, phasing and inter green period, saturation flow, optimization of signals; Vehicle actuated signal facilities; co-ordination of traffic signal, area traffic control system; Regulations- Basic principles of regulation of speed, drivers, mixed traffic, parking etc.; enforcement of regulation.

Module 6: Traffic Management and Road Safety

- Traffic management measures, Transport System Management techniques and its applications, case studies.

TP2.03: Public Transport Planning

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1: Public transport system

- Typology of public transport modes, genesis of mass transit system, Para transit system, technological features of rail and road-based mass transit systems.

Module 2: Public transport supply and demand

- Public transport demand and supply indicators, determinants of public transport supply, and demand, public transport supply and demand characteristics in cities of various sizes, physical and financial performance indicators for public transport, performance characteristics of various public transport modes in cities of various sizes.

Module 3: Public Transport and Urban Development

- Public Transport Based city form and Structure; Transit investments and urban growth; transit-oriented development; impact of city density, size and activity concentration on public transport patronage.

Module 4: Bus Route Network Planning and scheduling

- Type and density of bus route network, bus route network planning principles, public transport accessibility analysis, bus scheduling and time table principles.

Module 5: Bus stops, Terminals and Deport Infrastructure

- Bus stops –types and planning guidelines; Bus terminals- types, locations facilities and land area; interchange- concepts, functions and planning guidelines; bus deports- functions, activity and land requirements, planning guidelines.

Module 6: Economic Aspects of Public Transport

- Public transport fare types and pricing criteria, price elasticity of demand, consumer surplus.

TP2.04: Transport Economics

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1: Transport and Development

- Transport economics, movement transport and location, transport modes, transport economic development.

Module 2: Transport Demand and Supply

- Demand for transport, factors influencing demand, elasticity of demand, measures of elasticity, supply of transport, elasticity of supply, demand forecasting.

Module 3: Costing

- Fixed and variable cost, joint and common cost, cost allocation, user cost internal cost, external cost, economic cost.

Module 4: Pricing of Transport Services

- Principle of pricing, marginal cost pricing, price discrimination, revenues, transport subsidies, operational objectives of pricing, congestion pricing.

Module 5: Regulation of Transport

- Theory of regulation, priorities in transport policies, regulatory reforms, coordination for different modes of transport.

Module 6: Financing Transport

- Approaches for financing transport budgetary provisions, PPP models, innovative approaches and Examples

TP2.05: Design Studio

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
10	**0**	0	10	10	Jury	200	250	450	-

TP2.06: Traffic Laboratory and Software Application

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
10	**0**	0	10	10	Jury	200	250	450	-

TP2.07: Highway Planning and Design

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1: Highway Planning and Development

- Trends in highway planning and road development in country, Road development Plan, planning approaches for rural roads, highway administration and finance.

Module 2: Highway Survey and Investigation

- Types of survey, traffic surveys, alignment and route location, drainage studies, soil investigation, pavement design and investigation.

Module 3: Geometric Design and Standards

- Design criteria, horizontal and vertical alignment; design of simple curves, compound curves, reverse curves, transition curves; sight distance, cross sectional elements; principles of hill road design; intersections design; design standards for highways, vertical clearances for vehicle and pedestrian under/over passes.

Module 4: Pavements & Drainage System

- Types of pavement- rigid and flexible pavement, fundamental of pavement design skid resistance, pavement roughness, cost of construction and maintenance of different pavement types. Highway drainage principles, surface drainage, road side drainage, subsurface Drainage; cross-drainage structure-culverts, causeway and bridges.

Module 5: Estimation and costing

- Estimation and costing of earthwork, excavation, foundation, embankment of highway, flyover, sidewalk, tunnels and railway projects., estimation and costing of drainage and drainage structure; estimation of different items along with machinery, human resources, natural resources.

Module 6: Road Asset Management system.

- Overview of road Asset Management and management system; Information management of maintaining inventories, condition rate methodologies, information planning decision making and long-term impacts. Highway Design and Maintenance Model (HDM). Concept, model components, model input, utility of model output.

TP2.08: Road Safety and Environment

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1:

- Road safety scenario at national and global level, Collection and recording of the road accident data using A1 and A4 accident form.

Module 2:

- Road Safety Engineering- Traffic Sign, Marking, Traffic Control and Safety Measures)

Module 3:

- Accident Investigation, Analysis& Prevention, Countermeasures at Hazardous Locations, Black spot study. Statistical Analysis,

Module 4:

- Non-Engineering measures for improvement of Road Safety, Road Safety Audit at different stages of the project. Case Studies

Module 5:

- Basic definition of noise and measurements of Noise Level L10, L50, L90, LEQ Relationship between traffic flow and traffic noise, Noise abetment measures.

Module 6:

- Study of air pollution, Effect of Air Pollutants on Health. Different energy base and technological innovations in vehicle design, Greenhouse gas &Climate Change, Impact of transport on Climate Change, Environmental Impact Assessment, Demonstration of case studies of EIA.

SECOND YEAR: SEMESTER III

TP3.01: Intelligent Transport System

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course Content

Module 1: Introduction

- Definition, concepts, types of Intelligent Transport System (ITS).

Module 2: Technology and Architecture

- ITS technology, software, equipment's, architecture.

Module 3: Application of ITS in-Transport Infrastructure, Planning and Management

- Traffic planning and management, emergency and incident management, public transport system, terminal and depots management system, infrastructure management, commercial, vehicle management, highway surveillance, case studies. Cooperative Vehicle System, Traffic Management.

Module 4: Performance and Evaluation of ITS.

Module 5: Implementation

- ITS implementation, case studies, institutional and organizational issues

Module 6: Case Studies

TP3.02: Logistics and Urban Freight

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course Content

Module 1: Introduction to Logistics

- Logistics concepts; important decision area; logistics service providers; emerging concepts.

Module 2: Freight Demand and Distribution Network

- Determinants of freight demand; distribution channels; distribution costs; location decisions; transport modes selection; route selection (VRP); vehicle scheduling (TSP); fleet sizing.

Module 3: Warehousing and freight terminals

- Type of warehouses, planning and design consideration; types of freight terminals and their planning consideration (truck terminals, Integrated freight complex, Inland container depots, Logistics Hub, etc.)

Module 4: Urban Freight Planning

- Importance of urban freight, Key components and actors; Urban freight movement characteristics, Urban freight logistics sprawl and its impact; Urban freight information and its collection; freight demand assessment; freight handling facilities; city logistics.

Module 5: Urban Freight Management

- Vehicle access and loading/ unloading operations; low emission zones; night deliveries; nearly delivery areas, ITS applications.

Module 6: Urban Freight policy measures

- Objectives of urban freight; policy measures; planning policies; freight quality partnerships; supporting case studies.

TP3.03: Transport Infrastructure Design

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course content

Module 1: Basic Concepts:

- Introduction to Infrastructure, Overview of the Road, Rail, Air, IWT and Port Transportation Sectors.

Module 2: Road infrastructure

- Design of roundabouts; Design of grade separated intersection and interchange; design of tunnel roads; Design of bus stops, bus bays; Parking facilities (surface and multi – level) layout design, design of pedestrian facilities (subways, foot over bridges), cycle tracks etc. Multimodal Transport Interchange, Concept Design and Standards.

Module 3: Street Infrastructure

- Street Lightings- Source of lights, luminary type, lantern arrangement, quantity of illumination needed for different streets, lighting of dual carriageway; guard rails; traffic signs and marking; highway landscape; bus shelters; NMT (*Non-Motorized Transport) facilities etc.

Module 4: Rail infrastructure

- Different type of rail transit; Geometric design- cross-section, gradients, vertical and horizontal curves, transition curves; terminals- size, parking, circulation, platforms, passenger service and amenities area; case studies; metro/Mono/PRT/ RRT (*Mono-rail, personalized rapid transit system, regional rail transport) rail alignment and stations design elements; interchanges; case studies.

Module 5: Airports planning

- Airport location planning; Components of airport design; Air side development – Airport terminal design; environmental effect, Impact Land side development –

passenger building, cargo facilities, internal airport circulation and parking; Design of ground access facilities and airport support facilities etc.; land side airport connectivity planning.

Module 6: Multimodal interchange Planning and Design

TP3.04: Design Studio

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
9	**0**	0	9	9	Jury	150	250	400	-

TP3.05: Formulation of Thesis Research Topic and Literature Review

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
1	0	0	1	1	Internal Only	50	0	50	-

Course content:

- Module 1: Identification and Formulation of Thesis Research Problem,
- Module 2: Literature review.
- Module 3: Formulation of scope and objectives of the research study.
- Module 4: Methodology.
- Module 5: Identification of the Case study and secondary data collection.

TP3.06: Applied Quantitative Techniques and Software Applications

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	0	0	2	2	Internal Only	50	0	50	-

Module 1: Operation Research

- Linear Programming, Queuing Theory, Network optimization, Transhipment Models, Decision Analysis.

Module 2: Statistics

- Sampling Techniques, Statistical distribution, inference, ANOVA, regression analysis, factor analysis, discriminant analysis; SPSS, Minitab applications.

Module 3: Software Application

- Use of transport planning and highway engineering softwares such as TRANSYT, SIDRA.

Module 4:

- MX- ROAD, HEADS, HDM,

Module 5:

- VISSIM, VISUM

TP3.07: Engineering Economics

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course Content

Module 1: Interest formulae & their applications

- Time value of money, interest formulas-simple versus compound interest.

Module 2: Depreciation

- Method- straight line, declining balance, written down value method, sum of years' digits, sinking fund, service output.

Module 3: Present worth, future worth, annual equivalent method, Rate of Return Method.

- Revenue dominated cash flow-cost dominated cash flow. Return on investment & capital, B/C Ratio, NPV, IRR methods and applications.

Module 4: Highway Cost

- Schedule of standard rate, Capital cost, Annual highway cost, maintenance operation and construction cost. Financial

Module 5: Traffic forecast, Highway Revenue and Economic benefits

- Traffic forecasting Approaches-Time series, econometric models. Estimation of Toll revenue, Road User Benefits Vehicle operation cost; benefits; economic evaluation of highway projects.

Module 6: Economic Appraisal of Highway Projects.

- Importance of infrastructure, basic principles of appraisal, benefit valuation, cost benefit analysis, multi criteria analysis, case studies. Economic studies connected with highways related to improvements.

TP3.08: Analytical Transport Planning

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course Content

Module 1: Urban Travel Demand

- Demand for transportation, microeconomic demand theory, travel demand analysis, four stage demand modelling.

Module 2: Travel Choice

- Measurement of choice, preference techniques, willingness to pay, stated discrete choice models - Probit models, logit model, calibration of choice models, abstract mode choice, and value of time. Binary and Multinomial Logit Model, Incremental Logit Model, Independent of Irrelevant Alternative Property of Logit Model, Nested Logit Model Probit Model & Discriminant Analysis, Mode Choice Modelling through Stated & Revealed Preference Data. Examples with numerical.

Module 3: Lowry Land use Transport Model

- Principles of Land-use Transport modelling, Lowry Landaus Transport model concept inputs, modelling framework calibration.

Module 4: Inter-city Travel Demand

- Intercity travel demand characteristics, approach to intercity demand analysis, direct demand models.

Module 5: Simplified Travel Demand Models

- Traffic estimation (OD) from traffic counts, quick response techniques (QRT). Vehicle ownership forecasting, graph theory application in network analysis, activity based travel analysis.

Module 6: Preparation of Transportation Plan

- Evaluation and Selection of Best Alternative, Demonstration of Case Studies scenario building development of alternatives.

TP3.09: Public Transport and City Development

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Internal Only	100	0	100	-

Course Content:

Module 1: Cities and Urban Transport challenges

- Urbanization levels; motorisation rates; urban travel demand; Congestion levels; environmental quality levels, urban density and energy consumption patterns; transport investment and coordination issues.

Module 2: Sustainable Transport Planning

- Concept of sustainable development; sustainable mobility; sustainable transport system; sustainable transport planning - concept, principles and practices.; A-S-I framework.

Module 3: Public Transport Systems and Planning Principles

- Public transport modes, genesis of public transport system, Para transit system; technological features; Physical and Financial performance; Bus route Network Planning- form, type and density of bus route network, bus route network planning principles.

Module 4: Public Transport and Urban Development

- City forms – types, merits and limitations, Public transport-based city forms and structure; Transit Investments and Urban Growth; Impact of city density, size, activity concentration on public transport patronage; Transit and Land use Integration concept and principles; Transit Oriented Development.

Module 5: Sustainable transit-oriented cities

- Sustainable transit-oriented cities, case cities on Integrating Transit and Land use integration in adaptive cities, transit oriented and cycle friendly cities, low carbon development, profitable transit, BRT and urban regeneration, TOD supported by transport demand management.

Module 6: Integrating transit and urban development – Case cities

- Case Studies on integrating transit in developing cities; Barriers to integrating transit and urban development; challenges of inclusive transit-oriented development.; successful integration imperatives.

SECOND YEAR: SEMESTER IV

TP4.01: Transport Policy, Legislation and Institutional Framework

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Written-Exam	50	50	100	2 hrs.

Course Content

Module 1: Legislations and Acts

- Legislations in Roads, Railways, Civil Aviation, Ports sector, Logistics sector, Motor Vehicle Act, National Highway Act.

Module 2: Transport Policies for Various Modes of Transport

- Transport policies in sectors of road sector, Road transport, railways, civil aviation, IWT ports and shipping; national urban transport policy; urban transport policy; urban bus service provision policies, MRTS policies, Logistics sector policies; Financial outlays and budgetary support in transport sector, PPP in transport sector.

Module 3: Institutional Frameworks

- Institutional set ups in Roads, Road transport, Railways, Civil Aviation, Ports and Shipping, Metro Rail Corporations, State Road Transport Undertakings, City Bus Undertakings; Urban Transport set up in Municipal Authorities, local bodies etc; UMTA; Special Purpose Vehicles (SPV's), Role of NGO's etc; innovative methods in institutional strengthening

TP4.02: Thesis

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
12	**0**	0	12	12	Jury	400	400	800	-

TP4.03: Planning and Design for Universal Accessibility

Hrs / Week	Lecture	Tutorial	Studio	Credits	External Exam Type	Marks			Duration of (Theory) Exam
						Internal Assessment	External Examination	Total	
2	2	0	0	2	Assignment/ Presentation	100	0	100	-

Course content

Module 1:

- Approach, Principles of Universal Design and its areas of application.

Module 2:

- Barrier Free Public Transportation Terminal Design, Information Systems, Vehicle Loading, Safety issues at Platforms, Vehicle Design, Ticketing & Security, Trip Planning, Ticketing, Access, On board communication, Emergency, Advanced Technology

Module 3:

- Pedestrian Facility Sidewalk, Crosswalk, Subway, Foot over bridge, Skywalk, Walkability Cycle Tracks: Cycling accidents, Prediction of cycling Traffic Volume, Flow of Cycle Traffic, and Cycle Track Design

Module 4:

- Disability Acts of India, Singapore USA (ADA), UK, Australia, UNCRPD, Biwako Millennium Framework.

Module 5:

- Access Audit Road System, Railway System, Aviation System, Water Transport.

Module 6:

- Design of bus stops, bus bays; Parking facilities, layout design, Planning and Design considerations for BRT, Transport Interchange, Concept Design and Standards.