

Detailed Contents of Courses for the M.Engg Programme in Civil Engineering

Transportation Engineering

CE-561 Urban Transportation Planning

Coordination of City Planning and Transportation Planning. Trip generation, trip distribution, modal split, trip assignment models. Preparing landuse cum transport plans. Economic evaluation. Urban travel Characteristics and trends in travel demand. Basic urban transportation studies i/c origin destination surveys, Inventory use studies, Parking studies and transit surveys. Pedestrian facilities. Light rail and Mass Rapid Transit.

CE-562 Geometric Design of Highways

Design philosophy and present trends, Design controls and criteria. Design Speed, Safe Stopping & Passing Sight Distances, Road gradients, Superelevation. Capacity as Design control. Horizontal & Vertical alignments. Types of cross section, Speed Change Lanes, Medians, Design of at grade & grade separated intersections. Road-rail crossings, Road planning. Highway drainage, Roadside development. Design automation concepts and introduction to highway design software.

CE-563 Advanced Traffic Engineering & Management

Road inventory, Traffic measurements, flow, speed, road structures, driver, vehicle & pedestrian characteristic. Controlled & uncontrolled intersections. Signals, traffic light, road markings, traffic signs. One way and Tidal Flow System, Parking Controls, Environmental Management. Capacity Analysis of signalised and un-signalised intersections. Accident study and road safety. Intelligent Transport System

CE-564 Probability & Statistics

Probability: Concepts of Probability and their relevance to statistical analysis, Probability distributions relevant to transportation data analysis. Data Collection: Survey planning and design, traffic survey practice, inventory surveys, transport usage surveys, travel time and congestion surveys, matrix surveys, questionnaires and interviews, sources and use of secondary data, Statistics: Summary measures. Statistical distributions, confidence intervals, hypothesis testing, contingency tables, correlation and linear regression, ANOVA; Multivariate analysis

CE-565 Traffic Flow Theory

Traffic variables & parameters, ranges of traffic intensity, capacity of a roadway, bottle necks. Approaches to traffic flow theory, Traffic flow relationships, time-sequence diagram, Distribution of traffic variables, Head-way, speed distributions, traffic flow & different Queuing theory as applied to traffic flow, Traffic dynamics, Microscopic & Macroscopic models.

CE-566 Highway Materials & Construction

Properties & Usage of soil, sand & rock as highway materials. Modification & evaluation of their properties, Criteria for use & acceptance, testing, variability & Quality Control, requirements of crushed rock for surfacing, use of non standard material, material resources, in-service conditions & their effect on material performance. Properties & use of bitumens, asphalts, tars & concrete as pavement materials, Rheology of bitumens, bituminous coating of aggregates, optimization of bituminous mixtures, Asphalt concrete mix design. Quality Control & performance of bituminous & concrete pavement materials.

CE-567 Public Mass Transportation

The development of public transportation, Urban passenger modes, Comparative analysis and selection of transport modes, perspective of transport & highway planning, managing and operating public transportation system, policy considerations, Unconventional systems. Mass and Rapid Transit Systems.

CE-568 Airport Planning & Design

Air Transportation, classification & size of airports, Air craft characteristics, Airport Planning i/c necessary surveys, Ground transportation facilities, Airport capacity & delays, Air traffic control, layout & design of runways, taxiways & aprons, layout & design of terminals & service facilities, Passenger, Baggage & Cargo handling systems, lighting, visual aids, Maintenance equipment & operations, Airport drainage.

CE-569 Pavement Analysis & Design

Pavement type, stress distribution in pavements; theoretical and actual subgrade conditions & traffic loading, design principles, methods & criteria for flexible pavements, rigid & semi-rigid pavements. Design of special duty & temporary pavements. Environmental influences & effects, pavement overlays, Mechanistic Design of Pavements. Pavement Subdrainage.

CE-570 Transportation Economics

Economic function of Transportation; Economic Significance of Improved Transportation; Freight Rates and Locations of Industries and Markets; Technical and economic characteristics of different modes of transport; Development of transportation system in Pakistan including pricing, and regulation, railroads, highways, pipeline, water and air transportation; and the roles that these modes of transportation play in economic development; Economic efficiency of various modes of Transport; Explanation of travel or shipping behaviour within the paradigm of microeconomic demand and supply theory. Transport project appraisal.

CE-571 Waterway Transportation

Ocean transportation: Planning, ship characteristics, Location & design of Ports & harbours, environmental factors, general layout, effect of wind, wave and tides. General & bulk cargo berths & their installations, Transit sheds, Warehouses & cold storage. Design & construction of Breakwaters and docks. Channel Regulation and demarcation of harbour.

CE-572 Transportation Systems Evaluation

Concepts and principles of transportation economic analysis, transportation costs and benefits, user and nonuser consequences, needs studies, finance and taxation, methods of evaluation of plans and projects, cost-effectiveness, environmental impact assessment.

CE-573 Road Maintenance Management System

Introduction to Road Maintenance management System; Need for adoption of Road, Maintenance Management System, Types of Road Maintenance-Routine, Periodic Preventive/Proactive, Road Referencing System, Road Database and its Management, Road Data Collection in the form of Road Inventory, Feature Condition Survey, Accident Data Collection, etc and introduction to state-of the art equipments, Works Programming i.e. Prioritization of Roads for Maintenance, Type of Distress and their treatment, Road Asset Management System (RAMS), Preparation of Road Business Plans, Procurement of funding for maintenance, Road Fund, Toll collection, Bridge Management System, Organization for Maintenance Management, Road Disaster Prevention System.

CE-575 Railway Track Engineering

Evolution and Structure of the Railway Track, Coning of Wheels and Canting of Rails, Functions and Types of Rails; Rails Joints, Design of Fish-plated Joints, Modern Development in Insulated Rail Joints; Historic Development and Requirements of Sleepers, Types and Design of Sleepers; Classification of Railway Curves, Degree and Radius of Curves, Realignment of Curves; Ballast and Formation, Formation Treatment Methods; Track Maintenance Practices: Manual and Mechanised, Track Management System; Track Construction and Track Rehabilitation; Derailment Investigation Methods.