COURSE TITLE : TRANSPORTATION ENGINEERING
COURSE CODE : 6014
COURSE CATEGORY : A
PERIODS/WEEK : 6
PERIODS/SEMESTER : 90
CREDITS : 5

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Highway Engineering	22
2	Traffic Engineering	23
3	Railway engineering	23
4	Bridge ,Tunnel, Airport and Harbour	22
Total		**90**

COURSE OUTCOME

Sl.	Sub	Student will be able to
1	1	Know different modes and importance of transportation.
	2	Know the alignment, components and construction of permanent way
	3	Prepare & interpret the drawings related to the work.
2	1	Know the testing of materials on site and laboratory as per requirements.
	2	Understand the principles traffic Engineering
	3	Understand the methods for the up gradation, maintenance and repairs of existing roads.
3	1	Know component parts of railway
	2	Understand methods of survey ,alignment of railway and the signaling systems
	3	Comprehend on bridge, tunnel, airport and harbour

SPECIFIC OUTCOME

MODULE - I

1.1.0 Understand the history of road development which lead to current road plan and the fundamentals of traffic engineering.

1.1.1 State the importance of road transportation.
1.1.2 List the recommendations of Jayakar committee.
1.1.3 Identify the role of IRC & IRC classifications of roads and the list the salient features of current road plan.
1.1.4 Identify the details to be investigated through engineering survey and traffic survey to prepare a detailed report of a road project.
1.1.5 States the basic Es in transportation engineering and discuss its relevance.
1.1.6 Illustrate the different phases of engineering survey.
1.1.7 Explain different traffic surveys to be conducted in planning.
1.1.8 State the importance of various types of sight distance.
1.1.9 Draw different arrangements of at-grade intersections and grade separated intersections.
1.1.10 Explain different types of road structures, road markings and signals.

MODULE - II

2.1.0 Understand various aspects of road geometrics and road construction.

2.1.1 Explain the different layers of a road section and state the function of each layer.
2.1.2 Draw the cross section of road on level ground, embankment, cutting, partial cutting & partial filling and mark the components and width.
2.1.3 Explain various slopes of the road such as camber, gradient & types.
2.1.4 State super elevation.
2.1.5 Explain the need of supper elevation & widening of road on curve.
2.1.6 Explain different types of vertical and horizontal curves in roads.
2.1.7 State the importance of drainage in roads.
2.1.8 Explain different arrangements for surface and sub surface drainage.
2.1.9 Explain the different phases of road construction.
2.1.10 Illustrate the procedure of earth work for formation.
2.1.11 Explain the procedure for construction and maintenance of earthen road, WBM road and bituminous road.

MODULE - III

3.1.0 Understand the importance of railway and various components of railway system (track & station yard), track laying operation and signaling system.

3.1.1 State the importance of railway and classification based on gauge.
3.1.2 Identify various components of a permanent way such as rails, fasteners & fixtures, sleepers, Ballast, formation and function of each component.
3.1.3 Explain the need for conning of wheels and adzing of sleeper
3.1.4 Draw the cross section of a permanent way
3.1.5 Explain the track laying operations by various methods.
3.1.6 Draw the sketch of arrangement of a points and crossings and explain its function.
3.1.7 Explain different types of station yards based on their function.

3.1.8 Explain the objectives & types of signaling system and the importance of interlocking.

MODULE - IV

4.1.0 Understand an overall concept about bridges & culverts, tunneling, airport and dock &harbour.
4.1.1 Differentiate a bridge and a culvert.
4.1.2 Classify different types of bridges.
4.1.3 Define the bridge foundation.
4.1.4 Draw different types of bridge foundation.
4.1.5 Explain various components of sub structure and supper structure of a bridge.
4.1.6 State the function of approach road
4.1.7 Categorize bridge based on the approach alignment.
4.1.8 List the factors governing the selection of location for a bridge and bridge alignment.
4.1.9 Explain the different bridge parameters like economic span, afflux, linear water way, vertical clearance and scour depth.
4.1.10 Explain the details to be included in a bridge project report.
4.1.11 State the need for a tunneling work.
4.1.12 Explain the components of a tunnel with help of a sketch.
4.1.13 Draw different cross sectional shapes of a tunnel.
4.1.12 Differentiate different types of aircraft landing facilities.
4.1.14 Draw the layout of an airport, mark components and explain the function of each component.
4.1.15 List the factors deciding selection of site for air port and run way alignment pattern.
4.1.16 Define the standard runway length required for an air craft.
4.1.17 Define and differentiate a dock and a harbour.
4.1.18 List the categories of dock and harbour based on their function.
4.1.19 Draw the typical layout of a harbour, mark the components and explain the functions of each.

COURSE CONTENT

MODULE- I

Highway Engineering:- History of road development in India –Importance of roads and intermodal mix of traffic - Recommendations of Jayakar committee report & its implementation – Road plans in India – Salient feature of current road plan (Brief Description only).IRC – IRC classification of road – Urban road classification – Major SH and NH in Kerala.
Investigation and Planning of Highways: - Detailed project report for road project - Different types of surveys – Engineering surveys and Traffic surveys – The Es in traffic management.
Engineering Surveys :– Map study – Reconnaissance survey – Preliminary survey – Final location survey – Road alignment – Factors to be considered in road alignment – socio- economic studies – Environmental impact assessment -Drawings to be included in road project.
Traffic Engineering: – Traffic volume study – Traffic intensity studies - OD studies – Road intersection studies – Sight distance - stopping and overtaking sight distances - Road structures – Kerb – Medians/Dividers – Channelizing islands – pedestrian loading islands – Rotary islands – Intersections – types of at grade intersection – Grade separated intersections – Clover leaf junction – Trumpet junction – Road markings – Traffic signals – purpose of signals – Types of signals – Mandatory, cautionary and informatory signals.

MODULE- II

Highway Geometrics:– Road structure – sub-grade, sub-base course, base course and wearing course/pavement – Highway width - Carriage way, shoulders, formation width, right of way – Arboriculture - Cross-section of road on level ground, embankment, cutting, partially cutting & filling- Road slopes – camber, gradient-types of gradient – ruling, limiting and exceptional gradients – Supper elevation – widening of road on curves – Curves – Horizontal & vertical curves and their types – Road drainage – surface & sub surface drainage, catchment/intercepting drains.
Road Construction: – Earth work for road – forming the formation width – spoil bank and borrow pit – balancing of earth work – Compaction of sub grade – Construction of earthen road - Water bound Macadam road – Materials used – Construction of WBM road – Construction of bituminous road – prime coat & tack coat – premix Macadam & penetration Macadam – Seal coat - Bituminous Macadam road maintenance using cutback/emulsion and hot pre-mix Macadam – Flexible pavement & Rigid pavement

MODULE - III

Introduction: – Importance of railways – Classification of railway based on gauge
Permanent way - Component of permanent way – Formation – Ballast – functions & materials used - Rails – Types - Rail joints – types - requirements of good joint - fixtures and fasteners – fish plates & bolts, pandrol clip - sleepers – materials used - coning of wheel, adzing of sleepers - Cross section of a BG single and double line in cutting and embankment.
Laying and Maintenance: - Plate laying – definition, methods. Points and Crossings **-** Points, crossings, turn out, diamond crossing. (General description and sketches only)
Station yards:- Station yard – marshalling yard – goods yard – shunting yard – loco yard. (Brief description only)
Signaling and Interlocking: - Objectives of signaling – Types of signal - modern signaling methods – principles of interlocking. (Brief description and sketches)

MODULE - IV

Bridge and Culvert: – Types of bridges and culvert based on materials used, HFL, position of deck slab, alignment and IRC classification.
Foundation – Types of foundations used for bridge – well and pile foundation
Sub Structure – Abutment, pier and wing wall – different types
Super Structure – Bridge bearing - girder beams – Deck slab – RCC beam bridge – Plate Girder Bridge - steel trussed bridge – arch bridge and bow string girder - Parapet/Hand rail.
Approach road – function - different types of approach road alignment.
Alignment of bridge – types - economical span – linear water way - afflux and vertical clearance – permissible velocities – scour depth – prevention of scour
Bridge project - Surveys, plans and documents – Selection of site for bridge
Tunnel Engineering: - Necessity of tunnels and its uses – Parts of a tunnel – Audit tunnel – Vertical shaft – Common shapes – Tunnel lining - Typical section of a tunnel.
Air port Engineering:-Classification of airport – layout of an airport and location requirements – airport components –Runway, Apron, taxi way, terminal building, hangers, cargo, Fueling facility, Fire fighting, parking and circulation area – Run way alignment - pattern and layout of runways – Standard runway length - selection of site for airport.

Docks and Harbours: – Definitions – classification and their functions – components of dock and harbour - break waters – types - Layout.

REFERENCES

1. Ahuja & Birdi : Road Railway and Bridges ; Standard Book House
2. Khanna &Jesto :Transportation Engineering ; Nem Chand & Bros
3. Arora : Transportation Engineering ; Standard Publishers
4. S.P.Chadola :Transportation Engineering ; S.Chand& Co