

**COURSE TITLE : TRANSPORTATION ENGINEERING**  
**COURSE CODE : 4012**  
**COURSE CATEGORY : A**  
**PERIODS/WEEK : 6**  
**PERIODS/SEMESTER : 108**  
**CREDITS : 5**

### TIME SCHEDULE

<b>MODULE</b>	<b>TOPIC</b>	<b>PERIODS</b>
I	Roads – Fundamentals	24
	Test I	3
II	Roads – Construction	24
	Test II	3
III	Railways	24
	Test III	3
IV	Bridges, Tunnel , Airport Docks and Harbours	24
	Test IV	3
	<b>TOTAL</b>	<b>108</b>

#### ***Rationale***

*This subject caters to the needs of technician engaged in the investigation, planning, construction&maintenance of Roads, Railways, Bridges, Tunnels and Ports. In practical field each component of transportation is a specialized branch of engineering. This subject study aims acquiring a basic knowledge on all of the above fields in brief but over viewing all the different aspects of the subject in the limit of each module.*

### OBJECTIVES

#### **MODULE - I**

##### **1.1.0 Understand the importance of transportation engineering**

1.1.1 State the importance of transportation engineering

1.1.2 State the classification of roads as per IRC

##### **1.2.0 State the factors influencing selection of alignment for a road in plain and hilly areas**

1.2.1 Explain the surveys required for fixing alignment

1.2.2 List factors affecting alignment.

1.2.3 Explain the drawings required for a road project.

##### **1.3.0 Explain the components of a road with a sketch**

1.3.1 Explain the terms – camber, width of pavement, right of way, gradient,

1.3.2 List the width of pavement for different types of road..

1.3.3 State the necessity for super elevation

1.3.4 Define super elevation.

1.3.5 Calculate the value of super elevation

1.3. 6 know the limiting values of super elevation

1.3.7 Explain the different types of sight distances.

1.3.8 Explain different types of gradient.

- 1.3.9 Explain different types of curves.
- 1.3.10 Explain widening of roads on curves.
- 1.3.11 Explain the necessity, requirements and types of road drainage.
- 1.3.12 Draw the typical cross section of road in embankment.
- 1.3.13 Draw the typical cross section of road in cutting.

## **MODULE - II**

### **2.1.0 Understand the methods of laying different types of roads**

- 2.1.1 Explain the methods of constructing different types of roads
- 2.1.2 Explain the maintenance of different types of roads

### **2.2.0 Explain with neat sketches traffic islands and intersections**

- 2.2.1 Explain the purpose and types of traffic signs
- 2.2.2 Explain traffic volume study.
- 2.2.3 Explain different types of grade separators.

## **MODULE – III**

### **3.1.0 Understand the construction of railways**

- 3.1.1 State the advantage of railways
- 3.1.2 State the classification of railways based on gauges

### **3.2.0 Explain the components of a permanent way and their functions**

- 3.2.1 Explain the different types of rails, rail joint, rail fitting, and sleeper, ballast, used on Indian railway
- 3.2.2 Draw the typical cross section of a BG single and double line in cutting and embankment.

### **3.3.0 Understand the maintenance of railway tracks**

- 3.3.1 State the methods of laying the track
- 3.3.2 State the duties of permanent way inspector
- 3.3.3 Explain the general principles and maintenance operations for a railway track

### **3.4.0 Describe the different types of points and crossings with sketches**

### **3.5.0 Identify the different types of yards**

- 3.5.1 Describe with sketches the layout of yards
- 3.5.2 State the classification of stations

### **3.6.0 Describe with sketches the different types of signals and interlocking arrangements**

- 3.6.1 State the different types of signals
- 3.6.2 State the importance of interlocking
- 3.6.3 State the principle of interlocking

## **MODULE – IV**

### **4.1.0 Know the classification of bridges as per IRC**

- 4.1.1 State the classification of bridges as per IRC
- 4.1.2 Explain the factors influences selection of alignment and site for a bridge
- 4.1.3 Explain the terms – waterway, afflux, vertical clearance, and depth of scour.
- 4.1.4 List the survey, plans and documents to be prepared for a bridge project.
- 4.1.5 Define economical span for a bridge.
- 4.1.6 Explain the guidelines for depth of foundation for a bridge.

### **4.2.0 Describe with sketches the different components of a bridge sub-structure**

### **4.3.0 Describe with sketch, the different types of bridges super structure**

- 4.3.1 Distinguish between deck and through bridge

#### **4.4.0 Understand different types of tunnels**

4.4.1 Draw typical section of tunnel for NH road , railway

4.4.2 List the necessity of tunnels.

#### **4.5.0 Describe with sketches different parts of airport**

4.5.1 Explain runways, taxiways and Apron

4.5.2 List location requirements of air port.

4.5.3 List the factors to be considered while selecting the site for air port.

4.5.4 Draw different runway layouts.

#### **4.6.0 Understand different types of docks and harbor**

4.6.1 Explain the classification of harbours.

4.6.2 List the components of a harbor.

4.6.3 Define dock and list different types of docks.

4.6.3 Define break water and explain different types of break waters.

### **COURSE CONTENT**

#### **MODULE – I**

##### **Road Engineering**

Importance of roads, IRC classification of roads , Classification of urban roads

##### **Investigation for Road project**

Different types of road surveys – Fixing the alignment

of road – Factors affecting alignment – Drawings required for road project – key map, Index map, preliminary and detailed location survey plan Longitudinal and cross section

##### **Geometric Design of Highways**

Road structure – subsoil, sub grade, foundation course – base and wearing course - highway width for different classification of road - kerbs, road margin, road formation, right of way – camber-purpose and types – super elevation – definition, formula, minimum and maximum values. sight distance – different types –gradient - different types- Curves – necessity, types – horizontal ,vertical and transition -widening of roads on curves. Road drainage – surface drainage and subsurface drainage. Typical cross sections of a national highway in cutting and embankment

#### **MODULE – II**

##### **Highway Construction: -**

Pavement – objectives, structure, function, types.

Earthen Roads –borrow pits, spoil bank, lead and lift, balancing of earth work, construction procedure –

Water bound macadam roads – materials used - consistent parts – construction –maintenance

Bituminous roads – bitumen, asphalt, emulsion, cut back , tar, common grades for construction

- Types of bituminous surface – prime coat, tack coat, seal coat. Construction and maintenance

of Surface dressing – Grouted macadam - Premixed macadam - asphalt concrete - bituminous carpet with pre-coated chips. Hill Roads - Parts and functions – types of curves – drainage structures

##### **Traffic Engineering**

Traffic volume study – traffic control devices – road signs – signals – traffic islands

Road intersections at grade – grade separators – trumpet and cloverleaf patterns

## **MODULE –III**

### **Introduction**

Importance of railways – classification of railways based on gauges

### **Permanent way**

Component parts of permanent way.– types of Rails - Rail joints – types - requirements of good joint, fixtures and fastening – simple type of fish plates, coning of wheel, adzing of sleepers, sleepers – definition – materials used. Ballast – function – materials used.

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 and sketches only)

### **Signaling and Interlocking**

Objectives of signaling, signals types only - modern signaling methods –multiple aspect signaling system – two, three, four aspect system – drooping signals principles of interlocking. (Brief description and sketches)

## **MODULE – IV**

### **Introduction**

Surveys, plans and documents for bridge project – IRC classification of bridges. Selection of site – Alignment of bridge – economical span – determination of water way - afflux and vertical clearance – permissible velocities – scour depth, depth of foundation

### **Sub Structure**

Different types of piers – abutments (different types) – different types of wing walls – different types of approaches.

### **Super Structure**

Descriptive study of different types of bridges – deck, through and semi through bridges – RCC beam bridges – plate girder bridges steel trussed bridges – arch and bow string girder.

### **Tunnel Engineering**

Necessity of tunnels – typical section of tunnels for a national highway and a single and double broad gauge railway track

### **Air port Engineering**

Classification of airport – layout of an airport and locational requirements – airport components –Runway, aprons and taxi way – pattern and layout of runways.-selection of site for airport.

### **Docks and Harbours**

Requirement and classification – break waters – types, uses –docks.

## **REFERENCES**

1. Road Railway and Bridges -Ahuja & Birdi
2. Transportation Engineering – Khanna & Jesto,
3. Transportation Engineering – Arora, Standard Publishers
4. Transportation Engineering – S.P.Chadola – S.Chand & Co: