

<b>RGPV (DIPLOMA WING) BHOPAL</b>		<b>OBE CURRICULUM FOR THE COURSE</b>		<b>FORMAT-3</b>	<b>Sheet No. 1/3</b>
<b>Branch</b>	<b>CIVIL/ CTM</b>			<b>Semester</b>	<b>IV<sup>th</sup></b>
<b>Course Code</b>	<b>404</b>	<b>Course Name</b>	<b>TRANSPORTATION ENGINEERING</b>		
<b>Course Outcome 1</b>	To identify components of roads ,their dimensions, functions and IRC recommendations of different types of Roads.			<b>Teach Hrs</b>	<b>Marks</b>
<b>Learning Outcome 1</b>	Classify various types of Roads and State importance of Highway network and Road development plan.			<b>04</b>	<b>06</b>
<b>Contents</b>	Modes of transportation system- Road, Railways, airways, waterways and importance of each mode. Comparison relative merits and demerits of each mode. Importance of road in India. Classification of roads according to Nagpur plan (Location and function) and third road development plan. Traffic and tonnage, Classification of urban roads. Different road yojana ,like pradhan mantri gram sadak yojana ,Mukhya mantri sadak yojna.				
<b>Method of Assessment</b>	Pen Paper Test				
<b>Learning Outcome 2</b>	Describe Investigations required for Road alignment, factors affecting Road alignment and list of drawings required for different Roads and recognize various latest software related to Highway.			<b>12</b>	<b>08</b>
<b>Contents</b>	Reconnaissance survey, Preliminary survey and Location survey for a road project. Detailed survey for cross drainage- L-section and C/S sections. Fixing the alignment of road, factors affecting alignment of road . Drawings required for road project- Key map, index map, Preliminary survey plan and detailed location survey plan, L section and C/S sections cross drainage work, land acquisition plan. Survey for availability of construction material, location plan of quarries				
<b>Method of Assessment</b>	Pen Paper Test				
<b>Learning Outcome 3</b>	Design the Road Geometry, Sight distances, super elevation and gradient.			<b>12</b>	<b>10</b>

<b>Contents</b>	Camber- definition, purpose, types, IRC – specifications. Kerbs, road margin, road formation, right of way. Design speed- IRC – specifications. Gradient – definition, types, IRC specification. Sight distances–definition, types, IRC specification. Curves–Necessity, types– horizontal, vertical and transition curves. Widening of roads on curves. Super Elevation – definition, formula for calculating super elevation, minimum and maximum values of super elevation, and methods of providing super elevation. Sketching of standard C/S of national highway in embankment and cutting. Simple problems on geometric design of road		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Course Outcome 2</b>	Identify different road materials and explain construction procedure of different kind of roads.	Teach Hrs	Marks
<b>Learning Outcome 1</b>	Study Tests on Road materials and Visit to a road under construction / constructed.	<b>16</b>	
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Study of Los Angeles Abrasion Value of Aggregate.</li> <li>• Study of Impact Value of Aggregate.</li> <li>• Study of Flakiness Index , Elongation Index and Angularity Number of Aggregate.</li> <li>• Study of Ductility and Penetration value of Bitumen.</li> <li>• Study of Softening Point, Flash and Fire point of Bitumen.</li> <li>• To visit a road project for a road of minimum 0.5 km. length having at least one small cross drainage work</li> <li>• Prepare a visit report, which should consist of (a) List of various defects observed b) Suggestions regarding the possible remedial measure.</li> </ul>		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 2</b>	Describe the Construction Procedure of Bitumen and Concrete Roads.	<b>15</b>	<b>12</b>

<b>Contents</b>	Pavement – objective of pavement, structure of pavement, function of pavement components, types of pavement. General terms used in Earthwork. Construction procedure. Soil stabilized roads - necessity and brief details of mechanical soil stabilization. Introduction to Water bound macadam roads – Construction procedure including precautions in rolling. Construction of bituminous roads. Terms used– bitumen, asphalt, cutback, tar, common grades adopted for construction. Types of bituminous surface – prime coat, tack coat , seal coat. Surface dressing . – procedure of construction bituminous penetration macadam. Bitumen/Tar carpets – procedure of construction. Cement concrete pavements- Construction procedure and equipments. Construction joints, joint filler, joint sealer		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 3</b>	Recognize the types and location for Traffic signs and signals.	<b>10</b>	<b>08</b>
<b>Contents</b>	Traffic volume study, Traffic control devices-road signs, marking, signals, Traffic Island. Road intersections- intersections at grade and grade separator intersections. Road accident. Building code IS:1904.		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Course Outcome 3</b>	Select maintenance and repair techniques of roads and highway drainage arrangement.	Teach Hrs	Marks
<b>Learning Outcome 1</b>	Identify Components of Hill Roads and state causes and preventions of Landslides.	<b>08</b>	<b>06</b>
<b>Contents</b>	Parts and functions of hill road components, Hill road formation Land slides- causes and prevention. Structures- drainage structures. Surface drainage – side gutter, catch water drains, Subsurface drainage- Longitudinal drains and cross drains.		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 2</b>	Describe various road maintenance procedures and necessity of arboriculture.	<b>09</b>	<b>06</b>

<b>Contents</b>	Necessity of maintenance of roads, Classification of maintenance operation –ordinary, routine and periodic maintenance. Maintenance of W.B.M., bituminous and cement concrete roads. Road side arboriculture, necessity, planning of plantation of trees selection of types of threes and development of nursery considering the environment aspects.		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Course Outcome 4</b>	Identify gauges and component parts of railways	Teach Hrs	Marks
<b>Learning Outcome 1</b>	Classify zones in Indian Railways and Explain factors affecting selection of alignment and gauge.	<b>07</b>	<b>05</b>
<b>Contents</b>	Railway Alignment-Factors governing rail alignment, Rail gauges – types, factors affecting selection of gauges Necessity and importance of uniform gauges. Rail track cross sections – standard cross section of Broad Gauge and Meter Gauge. Railway Line- single & double line in cutting and embankment.		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 2</b>	State types of rails and explain Creep in Rails.	<b>10</b>	<b>10</b>
<b>Contents</b>	Rails- Types, functions dimension weight per meter Length, Idle Joints, Creep and causes of Creep, Welding of rails and its advantage. Ballast – function & different types their properties, relative merits and demerits. Sleepers – functions & requirement, types – wooden, metal, concrete sleepers & their suitability, sleeper density. Rail fixtures & fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers.		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 3</b>	Explain different gradient, Coning of wheels, canting of rails and cant deficiency. Prepare reports on Visit to different maintenance and operations related to Railway Track.	<b>10</b>	<b>09</b>
<b>Contents</b>	Coning of Wheels, Tilting Of Rails, Gradient & Its Types, Super Elevation On Curves, Cant Deficiency, Negative Cant,		

	<p>Grade Compensation On Curves. Points &amp; Crossing, A Simple Split Switch Turnout, Line Sketches Of Track Junctions Crossovers-Scissor, Diamond Crossing. Site selection for railway stations , Requirements of railway station, types of stations -way side, crossing, junction &amp; terminal. Station yards, types of station yard, passenger yards, goods yard, locomotive yard- its requirement, Marshalling yard. Purpose of laying of railway track, different method of laying Maintenance of Railway-necessity, types, tools required organization required for maintenance. Duties of of Permanent way Inspector, Gang man, Key man.</p> <p>The write-ups of the Visit reports should include (a) Objects of maintenance operations (b) Materials requires, Tools ,Equipments needed and Maintenance needed (c) Precautions to be taken and Remedial measures and quality control to reduce the maintenance requirements</p>		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Course Outcome 5</b>	Identify Bridge types , Components of Bridge and methods of Tunneling.	Teach Hrs	Marks
<b>Learning Outcome 1</b>	Classify different types of bridges and describe factors affecting selection of site of a bridge.	<b>10</b>	<b>10</b>
<b>Contents</b>	<p>Factors affecting selection of site of a bridge. bridge alignment, collection of design data. Classification of bridges according to function, material, span, size, alignment, position of HFL Permanent bridges – Culverts ,causeways, Steel bridges, RCC girder bridge, pre stressed girder bridge, cantilever, suspension bridge, flyover bridge. Temporary bridge – timber, flying, floating bridge. Plan &amp; sectional elevation of typical bridge showing component parts of substructure &amp; super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard etc.,</p>		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 2</b>	Draw layout of bridge super structure and discuss the functions of Bearings.	<b>06</b>	<b>05</b>

<b>Contents</b>	Foundation –piers-function & types., abutment – function, types. Wing walls – functions and types, Bearing – functions, types of bearing for RCC & steel bridges, Approaches –Functions & types Bridge flooring- open and solid floors Inspection of bridges and checklist of Bridge Inspection Inspection & maintenance of bridges- routine and special maintenance.		
<b>Method of Assessment</b>	Pen Paper Test		
<b>Learning Outcome 3</b>	To know various definitions of Tunnel Engineering and Classification, Shape, Size, Investigation and survey.	<b>06</b>	<b>05</b>
<b>Contents</b>	Definition, necessity, advantages, disadvantages. Classification of Tunnels. Shape and Size of Tunnels Tunnel Cross sections for highway and railways. Tunnel investigation and surveying- locating Centre line on ground, transferring center line inside the tunnel. Shaft - its purpose and Construction Methods of tunneling in Soft rock needle beam method, fore poling method. Line plate method Shield method Methods of tunneling in Hard rock-Full-face heading method, Heading and bench method, drift method. Precautions in construction of tunnels Tunnel lining and ventilation-Purpose and method.		
<b>Method of Assessment</b>	Pen Paper Test		

### REFERENCE BOOKS:

S.No.	Title	Author	Publisher
1)	Highway Engineering	Khanna & Justo	Khanna Pub.
2)	Traffic Engineering	L.R. Kadiyali	
3)	Transportation Engineering	N.L.Arora,S.P.Luthara	I.P.H. New Delhi
4)	Transportation Engineering	Vazarani & Chandola	Khanna Pub.
5)	Road, Railway, Bridges	Biridi & Ahuja	S.B.H.New Delhi
6)	Transportation Engineering	Kamala	T.M.H. New Delhi
7)	Railway Engineering,	S.C. Saxena	Dhanpatrai & sons
8)	Principles of Railway Engineering	S.C. Rangwala	Charotar Publication

9)	Elements of Bridge Engineering	J.S. Alagia	Charotar Publication.
10)	Bridge Engineering,	D.R. Phatak	Everest Publisher
11)	Road, Railway and Bridges	Birdi & Ahuja.	Std. Book House.
12)	Tunnel Engineering	S.C. Saxena	Dhanpatrai & sons.
13)	MORTH		

**IS / International Codes. :** IRC 36 – 1970, IRC 16 –1965, IRC 20 -1966 IS 4880, I.S. 5878, Part-I to X.