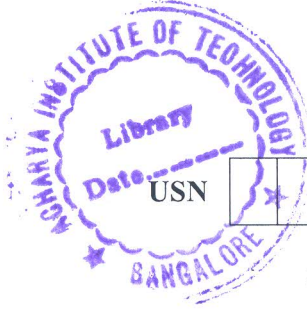


# CBCS SCHEME

15CV63



USN

## Sixth Semester B.E. Degree Examination, June/July 2019 Highway Engineering

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Mention different modes of transportation. Explain the characteristics of road transport in comparison with other systems. (08 Marks)
- b. Determine the length of different categories of roads in a state in India by the year 2021 as per 3<sup>rd</sup> year road plan formulae. The area of state is 3,08,000 km<sup>2</sup>. Number of Towns as per 1981 census was 276. Overall road density aimed at 82km per 100km<sup>2</sup>. (08 Marks)

OR

- 2 a. What are the types of roads and its classification? Briefly outline classification of urban roads. (08 Marks)
- b. Three new roads A, B and C are to be completed in a district during a five year plan period. Work out the order of priority for phasing the plan programme by maximum utility principle, from the data given below. Adopt utility unit of 1.0 for serving a village with population range 2000-5000, for catering for 1000T of agricultural products or per 100T of industrial products. Assume any other required data suitably.

Road	Length km	Number of village served population			Productivity 1000T	
		<2000	2000 – 5000	>5000	Agricultural	Industrial
A	15	10	8	3	15	1.2
B	12	16	3	1	11	0.0
C	18	20	10	2	20	0.8

(08 Marks)

### Module-2

- 3 a. Clarify the features of ideal alignment and enumerate factors affecting alignment. (08 Marks)
- b. Write a brief outline on engineering surveys. (08 Marks)

OR

- 4 a. With neat sketches illustrate different cross section elements. (08 Marks)
- b. The speed of overtaking and overtaken vehicles are 70 and 40 kmph respectively on a two way traffic road. If the acceleration of overtaking vehicle is 0.99 m/sec<sup>2</sup>.
- Calculate safe overtaking sight distance.
  - Mention the minimum length of overtaking zone
  - Draw a neat sketch of the overtaking zone and show the positions of the sign posts.

(08 Marks)

### Module-3

- 5 a. With neat sketches illustrate conduction of plate load test to determine modulus of subgrade reaction. (08 Marks)
- b. Distinguish between :
- Tar and Bitumen
  - Cutback and Emulsion.

(08 Marks)

OR

- 6 a. Enumerate different types of pavements with their component parts and functions of each component. (08 Marks)
- b. Calculate ESWL of a dual wheel assembly carrying 2004 kg each for pavement thickness of 15, 20 and 25 cms. Centre to centre tyre spacing = 27cm and distance between the walls of the tyres = 11cm. Use graphical method. (08 Marks)

Module-4

- 7 a. Briefly outline the design procedure of soil aggregate mixes by Rothfuch's method. (08 Marks)
- b. Explain the procedure of marshall mix design of Bituminous mixes. (08 Marks)

OR

- 8 a. Enumerate in detail the requirements, specifications of materials and the construction steps for a wet mix macadam (WMM) layer. (08 Marks)
- b. Explain in detail the requirements, specifications of materials and the construction steps for pavement quality concrete. (08 Marks)

Module-5

- 9 a. Explain with sketches how the subsurface drainage system is provided to lower the water table. (08 Marks)
- b. The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is  $0.9 \text{ m}^3/\text{sec}$ . Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec and  $n = 0.02$ . (08 Marks)

OR

- 10 a. Briefly describe the different methods of economic analysis of a highway. (08 Marks)
- b. Calculate the annual cost of a stretch of a highway from the following particulars:

Item	Total cost (Rs. in lakh)	Estimated life (years)	Rate of interest (%)
Land	12	100	6
Earthwork	9.0	40	8
Bridges and culverts	7.5	60	8
Pavement	14	15	10

(08 Marks)

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