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10CV56

Fifth Semester B.E. Degree Examination, July/August 2021
Transportation Engineering – I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain the role of transportation in rural development of India. **(06 Marks)**

b. Briefly explain the characteristics of road transport. **(06 Marks)**

c. Three view roads A, B and C are to be completed in a district during a five-year period. Using the data given in Table Q1 (c), work out the order of priority for phasing the plan programme by the principle of maximum utility per length. Assume the data suitably.

Road	Length (km)	Number of villages served (Population)			Productivity, 1000 tonnes	
		<2000	2000 - 5000	>5000	Agricultured	Industrial
A	27	10	8	3	20	1.2
B	21	16	3	1	18	0.2
C	31	20	10	2	12	0.8

Table Q1 (c) **(08 Marks)**

2 a. Briefly explain the contributions of the following in the road development in India:
(i) Central road fund
(ii) Indian road congress. **(08 Marks)**

b. The area of certain district in India is 13400 sqkm and there are 12 towns as per 1981 census. Determine the lengths of different categories of roads to be provided in the district by the year 2001. **(06 Marks)**

c. What are the methods of classification of roads? Mention their respective classification of roads. **(06 Marks)**

3 a. Briefly explain the engineering surveys needed for locating a new highway. **(06 Marks)**

b. Explain the following:
(i) Camber
(ii) Kerbs
(iii) Medians. **(09 Marks)**

c. Calculate the SSD on a highway at a descending gradient of 2% for a design speed of 80 kmph. Assume other data as per IRC recommendations. Also, calculate Head light sight distance and intermediate sight distance. **(05 Marks)**

4 a. What are the objectives of providing:
(i) Super elevation and
(ii) Extra widening of pavements on horizontal curves. **(06 Marks)**

b. A two-lane highway has a horizontal curve of radius 200 m and total length of curve is 240 m. The distance between the centre line of the highway and the centre of inner lane is 1.95 m at the curve. If the desired right distance is 340 m. Determine the set back distance required. **(06 Marks)**

c. Briefly explain the different types of gradients used for highways. **(08 Marks)**

5 a. List and explain the desirable properties of subgrade soil. **(06 Marks)**

b. Write short notes on : (i) Cutback bitumen (ii) Bitumen emulsions. **(08 Marks)**

c. A plate load test was conducted on soaked subgrade during monsoon season using a plate diameter of 30 cm. The load values corresponding to mean settlement dial readings are given in table 5 (c). Determine the modulus of subgrade reaction for the standard plate.

Mean settlement values, mm	0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load values, kg	0	460	900	1180	1360	1480	1590	1640

Table Q5 (c) **(06 Marks)**

6 a. Draw the typical cross-section of flexible pavements and briefly explain the functions of each. **(08 Marks)**

b. Briefly explain the functions of different types of joints in rigid pavements. **(08 Marks)**

c. Briefly describe the following:
(i) Modulus of subgrade reaction.
(ii) Radius of relative stiffness. **(04 Marks)**

7 a. Describe the steps in construction of wet mix Macadum roads. **(08 Marks)**

b. Explain the construction steps for cement concrete roads. **(08 Marks)**

c. List the requirements of highway drainage. **(04 Marks)**

8 a. Calculate the annual cost of a stretch of highway from the following particulars: (Table Q8 (a)).

Item	Total Cost (lakhs)	Estimated life (Years)	Rate of Interest (%)
Land	35	100	6
Earthwork	40	40	8
Bridges & drainage	50	60	8
Pavement	100	15	10
Traffic signs	15	5	10

Table Q8 (a)

Average cost of maintenance of the road is Rs.1.5 lakhs per year. **(06 Marks)**

b. Explain the concept of BOT and BOOT in highway financing. **(06 Marks)**

c. Briefly explain the methods of sub surface drainage system. **(08 Marks)**

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