CBCS SCHEME

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18CV56

Fifth Semester B.E. Degree Examination, Feb./Mar.2022
Highway Engineering

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. What are the characteristics of road transport in comparison with other systems? **(06 Marks)**

b. List the significant recommendations of Jayakar committee. What are the implementations based on Jayaker committee recommendation. **(06 Marks)**

c. For the following data of population units of 0.5, 1.0, 2.0 and 1.0 per 1000 tonnes, 500 tonnes and 100 tonnes of agricultural, raw material and industrial products respectively. Find the priority for the following system of roads.

Proposal	Length (km)	Population range			Productivity		
		<1000	1001 – 2000	> 2000	Agri	Raw material	Industrial Products
A	25	20	15	25	8000	4000	1000
B	35	30	20	40	6000	1000	1600
C	40	50	20	60	4500	2000	3200
D	30	15	12	30	4000	6000	500

(08 Marks)

OR

2 a. What is an ideal alignment? Explain with neat sketches, how you will align through, (i) Hill pass, (ii) Bridge site (iii) Marshy land. **(08 Marks)**

b. Determine the lengths of different categories of roads in a state in India by the year 2001, using the following data:
Area of state : 15000 km^2
No. of towns : 20 numbers
Road density : 82 km/ 100 km^2. **(08 Marks)**

c. List the salient features of KSHIP, PMGSY **(04 Marks)**

Module-2

3 a. Sketch a neat cross section of NH in rural section in embankment and cutting. **(06 Marks)**

b. Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from opposite directions at 90 kmph and 60 kmph. Assume the reaction time of 2.5 sec, co-efficiency of friction of 0.65 and a break efficiency of 55% in either case. **(08 Marks)**

c. List the factors affecting skid resistance. **(06 Marks)**

OR

4 a. The speed of overtaking and overtaken vehicles are 80 and 50 kmph respectively on a 2-way traffic road. If acceleration of overtaking vehicle is 0.99 m/sec^2. Calculate OSD, mention minimum length of overtaking zone, draw a neat sketch of the minimum overtaking zone and show the positions of the sign post. **(10 Marks)**

b. Derive an expression for super elevation such that speed can be substituted in kmph. **(05 Marks)**

c. An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A Summit curve is to be designed for a speed of 80 kmph so as to have an overtaking sight distance of 470 m. **(05 Marks)**

Module-3

5 a. List and briefly explain the desirable properties of subgrade soil. **(05 Marks)**

b. List and explain desirable properties of Aggregates to be used in road construction. **(05 Marks)**

c. CBR tests were conducted on two specimens of a soil. Determine CBR value of the soil if 100 division of the load dia/proving ring represents 190 kg load in the calibration chart of the proving ring. Use following data:

Penetration of plunger (mm)	Load dial readings, divisions	
	Specimen - 1	Specimen – 2
0	0	0
0.5	8	0.5
1.0	15	1.5
1.5	23	2.5
2.0	29	6.0
2.5	34	13
3.0	37	20
4	43	30
5	48	38
7.5	57	50
10	63	58
12.5	67	63

(10 Marks)

OR

6 a. Differentiate between Tar and Bitumen. **(05 Marks)**

b. List the basic structural components of a flexible pavement and briefly explain the function of the same with a neat figure. **(08 Marks)**

c. Calculate ESWL of a dual wheel assembly carrying 2004 kg each for pavement thickness of 15, 20 cm. Centre to centre spacing = 27 cm and distance between the walls of tyres = 11 cm. **(07 Marks)**

Module-4

7 a. Briefly explain Ruthfutch method. **(10 Marks)**

b. Describe step by step procedure for subgrade preparation, with proper specifications. **(10 Marks)**

OR

8 a. With detailed procedure, describe the method of constructing WBM. **(08 Marks)**

b. Write the specification for Bituminous concrete also provide step by step procedure for laying Bituminous concrete layer. **(09 Marks)**

c. Define Tack coat, Seal coat, Prime coat. **(03 Marks)**

Module-5

9 a. Briefly explain the significance of highway drainage. **(10 Marks)**

b. With neat sketches, explain lowering of water table, control of seepage flow.[Clay seal method and transverse method] **(10 Marks)**

OR

10 a. With a neat relevant sketch, explain the procedure for design of filter material in Highway drainage. **(10 Marks)**

b. Explain briefly the quantifiable benefits for a highway user. **(06 Marks)**

c. Write short notes on BOT and BOOT concepts. **(04 Marks)**

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