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Fifth Semester B.E. Degree Examination, June/July 2023 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. Mention different modes of Transportation. Explain the characteristics of road transport in comparison with other systems. (10 Marks)
- b. 3 New Roads R1, R2 and R3 are to be completed in a District during five year period. Using the data given below workout the order of priority for placing the plan program by the principle of maximum utilities per unit length. Adopt utility unit of 0.5 < 2000 , 1.0 for 2000 – 5000 and 2.0 for > 5000 , 1.0 for 1000 t of agricultural product and 1.0 for 100 t of Industrial products. (10 Marks)

Road	Length	No. of Villages served population			Productivity 1000 tonnes	
		< 2000	2000-5000	> 5000	Agriculture	Industries
R1	15	10	8	3	15	1.2
R2	12	16	3	1	11	0.0
R3	18	20	10	2	20	0.8

OR

- 2 a. Write short note on :
i) NHDP ii) PMGSY iii) KSHIP iv) KRDCL. (10 Marks)
- b. List out the factors affecting alignment and explain important stages of Engineering Survey of Highway Alignment. (10 Marks)

Module-2

- 3 a. Explain briefly two important surface characteristics influencing Highway Geometric Design. (10 Marks)
- b. The speeds of overtaking and overtaken vehicles are 70 and 40 kmph respectively on a two way traffic road. The average acceleration during overtaking operation is assumed as 0.99m/sec^2 .
i) Calculate safe overtaking sight distance.
ii) What is the minimum length of overtaking zone?
iii) Draw a neat sketch of overtakes zone indicating the positions of sign posts. (10 Marks)

OR

- 4 a. Enlist the gradients encountered in vertical Alignment and explain briefly. (10 Marks)
- b. A vertical summit curve is formed at the intersection of 2 gradients , +3.0% and -5.0%. Design the length of summit curve to provide a SSD for a design speed of 80 kmph. Assume missing data suitably. (10 Marks)

Module-3

- 5 a. With a neat sketch, illustrate conduction of Plate Load test to determine modulus of subgrade reaction. (10 Marks)
- b. List the desirable properties of Bitumen and tests to be conducted on Bitumen. (10 Marks)

OR

- 6 a. Draw and explain the Component part and functions of each component of Flexible and Rigid pavement. (10 Marks)
- b. The CBR test results are as follows. Apply correction and determine the CBR value of the soil. (10 Marks)

Load in kgs	0	2	4	9	20	34	49	74	92	118	125
Penetration in mm	0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0

Module-4

- 7 a. Briefly outline the design procedure of soil aggregate mixes by Ruth fatch method.(10 Marks)
- b. Enumerate the requirements , specification of materials and construction steps for Wet Mix Macadom (WMM). (10 Marks)

OR

- 8 a. Explain briefly the construction procedure of Bitumen concrete (BC) with Quality control checks as per MORTH. (10 Marks)
- b. List the quality checks on Cement Concrete Pavement (PQC) carried out both in the laboratory and at field. (10 Marks)

Module-5

- 9 a. Explain the significance and requirements of a Highway Drainage System. (10 Marks)
- b. Explain with sketches, how the subsurface drainage system is provided to lower the GWT. (10 Marks)

OR

- 10 a. Explain the following with respect to Highway Financing : (10 Marks)
- i) BOT ii) BOOT iii) VOC.
- b. Calculate the annual cost of a stretch of Highway from the following particulars :

Item	Total cost Rs. in lakhs	Estimated life, years	Rate of interest, %
Land	35.0	100	6
Earth work	40.0	40	8
Bridges, culvert and drainage	50.0	60	8
Pavement	100.0	15	10
Traffic signs and Road Items	15.0	5	10

The average cost of maintenance of the road is Rs 1.5 lakhs per year. (10 Marks)

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