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Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Highway Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume the missing data, if any, as per IRC codes.**

Module-1

- 1 a. List the objectives and functions of the following in Highway development in India.
 - i) Indian Roads congress
 - ii) Central Road Research Institute. (06 Marks)
- b. What is the contribution of KRDC and KSHIP in the road development in Karnataka? (08 Marks)
- c. List and elaborate the various advantages and disadvantages of Road transport compared with other modes of transport. (06 Marks)

OR

- 2 a. Elaborate on various salient features of VISION 2021. (06 Marks)
- b. What are the various factors affecting highway alignment? Explain each one, in detail with the help of neat sketches. (08 Marks)
- c. What are the objectives of preliminary survey in highway Alignment? Enumerate the detail to be collected in it. (06 Marks)

Module-2

- 3 a. Calculate the stopping sight distance on a highway for a vehicle moving at 80kmph on a
 - i) Level Road
 - ii) On a road having 1 in 100 grade (ascending and descending)
 Assume other data as per IRC recommendations. (08 Marks)
- b. Explain PIEV theory with a neat sketch. (06 Marks)
- c. What are the various factors affecting friction? Also explain skid and slip failures, in detail. (06 Marks)

OR

- 4 a. Enumerate the steps for practical design of super elevation considering mixed traffic. (06 Marks)
- b. Find the total width of pavement on a horizontal curve for a two lane National highway to be aligned along a rolling terrain with ruling minimum radius. (08 Marks)
- c. List the various objects of providing a horizontal transition curve? Also explain the various shapes of transition curve and ideal transition curve. (06 Marks)

Module-3

- 5 a. List and explain the various desirable properties of subgrade soil as highway material. (06 Marks)
- b. List the various properties of coarse aggregate and the tests to be conducted to find each property of coarse aggregate. (06 Marks)
- c. How do you find CBR value in the Laboratory? Explain the test procedure with a neat sketch. (08 Marks)



OR

- 6 a. A plate load test was conducted on a soaked subgrade during monsoon season using a plate of diameter 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of subgrade reaction for the standard plate :

Mean settlement value, in mm	0.0	0.26	0.52	0.76	1.02	1.26	1.53	1.76
Load values, in Kg	0.0	540	1010	1290	1510	1550	1730	1900

(08 Marks)

- b. What do you understand about HRB soil classification? Explain in detail? (06 Marks)
- c. Calculate the ESWL of a dual wheel assembly arraying 2044kg each for a trail pavement thickness values of 150, 200 and 250mm, if the centre to centre spacing between the two tyres = 270mm, clear gap between the wall of the tyres = 110mm (06 Marks)

Module-4

- 7 a. With a neat sketch, explain the method of determining the aggregate- bituminous mixes proportioning by Rothfuch's method. (08 Marks)
- b. List the explain the various construction steps in the WMM base construction. (06 Marks)
- c. What do you understand by Tack coat and Prime coat? List the various objectives of providing these in pavements. (06 Marks)

OR

- 8 a. Explain the various steps in the construction of Dense bituminous macadam pavement. (10 Marks)
- b. Step by step, explain in detail, construction of Dry Lean Concrete sub base course. (10 Marks)

Module-5

- 9 a. List the objects of
- Surface drainage
 - Sub surface drainage of roads.
- b. What are various cross drainage structure? Explain each one of those. (06 Marks)
- c. What do you understand by
- Lowering of water table
 - Control of seepage flow
 - Control of capillary rise.
- Explain with neat sketches. (09 Marks)

OR

- 10 a. Compare the annual costs of a 2 lane road for two types of pavement structures
- WBM with thin bituminous surface at a total cost of Rs 100 lakhs per km, life of 10 years, interest at 10%, with a salvage value of Rs 2.50 lakhs after 10 years, and annual average maintenance cost of Rs 5 lakhs/km
 - Bituminous macadam base and bituminous concrete surface, with a total cost of Rs 200 lakhs/km, life of 15 years, interest at a rate of 8%, salvage value of 3.50 lakhs at the end of 15 years, with annual average maintenance cost Rs 7.5 lakhs/km. Comment which one is more economical? (08 Marks)
- b. What is Public Private Partnership? How it will help the Road projects in India? Explain. (06 Marks)
- c. What are the various advantages and disadvantages of Benefit cost ratio method? Explain the method with formulae. (06 Marks)

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