CBCS SCHEME

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18CV56

Fifth Semester B.E. Degree Examination, July/August 2021
Highway Engineering

Time: 3 hrs. Max. Marks: 100

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

1 a. Discuss the Socio-economic impact of improving transport infrastructures. **(04 Marks)**

b. What are the recommendations of Jayakar Committee and how they are implemented? **(08 Marks)**

c. Explain the saturation system for finding the optimum road length. **(08 Marks)**

2 a. Determine the length of different categories of road by the year 2001, using third road development formula by using the following data. Assume missing data suitably,
Total area of the state = 80,000 sq.km
Total number of towns as per 1981 census = 86. **(04 Marks)**

b. What are the salient features of the following programme / schemes:
(i) NHDP (ii) PMGSY. **(08 Marks)**

c. What are the data/details collected in Reconnaisance and preliminary survey of highway alignment. **(08 Marks)**

3 a. Write a neat sketch of Highway in,
(i) Embankment (ii) Cutting and label various components. **(04 Marks)**

b. Calculate the Head Light Distance (HSD) and Intermediate Sight Distance (ISD) from the following data:
Design speed = 80 kmph, Coefficient of friction = 0.35, Reaction time = 2.5 sec. **(08 Marks)**

c. Design the rate of super elevation for horizontal curve of a highway of radius 500 m and speed 100 kmph. **(08 Marks)**

4 a. Write a short note on different types of gradients of a highway. **(04 Marks)**

b. Design the length of transition curve from the following data:
Ruling design speed V = 80 kmph, Normal pavement width = 7.0 m, Rate of introduction of super elevation = 1 in 150, Pavement is rotated about inner edge. Assume two lane road and wheel base as 6.0 m. **(08 Marks)**

c. Design the length of valley curve from the following data to fulfill comfort conditions and HSD:
(i) A descending grade of 1 in 25 meets ascending of 1 in 30.
(ii) Design speed of 80 kmph
(iii) Assume C = 0.6 m/sec^3
(iv) Assume t = 2.5 sec, f = 0.35 **(08 Marks)**

5 a. List the desirable properties of soil used as a highway material. **(04 Marks)**

b. A plate load test was conducted on soaked subgrade during the mansoon season using a plate diameter of 30 cm. Determine the modulus of subgrade reaction for the standard plate using the following data: **(08 Marks)**

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

c. Mention any four tests conducted on (i) Aggregates (coarse) (ii) Bitumen
Also mention the standard values / range of each test. **(08 Marks)**

6 a. Differentiate between Bitumen and Tar. **(04 Marks)**

b. With the help of a neat sketch, explain the different component parts of a flexible pavement. Also mention their functions. **(08 Marks)**

c. Explain the concept of ESWL with the help of a neat sketch. **(08 Marks)**

7 a. Explain the method of soil aggregate blending by Rothfutch's method. **(10 Marks)**

b. Explain the step by step procedure of construction of Granular Sub Base (GSB) layer of pavement by mentioning physical properties of aggregate, gradation requirement (either for G-II or G-III) and quality control test for the layer. **(10 Marks)**

8 a. Explain the step by step procedure of construction of Bituminous Macadam (BM) layer of pavement by mentioning physical properties of aggregate, Gradation requirement (for G-II) and quality control test for the layer. **(10 Marks)**

b. Explain the step by step procedure of construction of Dry Lean Concrete (DLC) of a rigid pavement by mentioning physical properties of aggregates. Gradation requirement and Quality control tests for the layer. **(10 Marks)**

9 a. List the requirements and importance of Highway drainage. **(06 Marks)**

b. Explain with the help of a neat sketch:
   (i) Lowering the high water table in permissible soil strata.
   (ii) Control of seepage flow in Highway drainage. **(07 Marks)**

c. The maximum quality of water expected in one of the open longitudinal drain on a clayey soil is 0.9 m^3/sec. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of trapezoidal section to be 1.0 m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in drain is 1.2 m/sec and Mannings roughness coefficient is 0.02. **(07 Marks)**

10 a. Write a note on:
   (i) Motor Vechicle operation cost.
   (ii) Annual Highway cost. **(06 Marks)**

b. Write a note on:
   (i) Rate of return method.
   (ii) Benefit-cost ratio method of economic analysis of highway project. **(07 Marks)**

c. Write a note on:
   (i) BOT and BOOT
   (ii) Sources of Revenue for highway development and maintenances **(07 Marks)**

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