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Sixth Semester B.E. Degree Examination, June/July 2018
Highway Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Explain the various characteristics of road transport. **(08 Marks)**
   b. What are the significant recommendations of Jayakar committee report? Explain how it is implemented in the road development of a country. **(08 Marks)**

OR

2 a. Briefly explain about planning surveys for a highway project. **(08 Marks)**
   b. The area of a district is 13400 sq km and there are 12 towns as per 1981 census. Determine the length of different categories of roads to be provided in the district by the year 2001. Assume over all density of road length is 82 km per 100 sq km area. **(08 Marks)**

Module-2

3 a. Explain with sketches the various factors controlling the alignment of a road. **(08 Marks)**
   b. What are the objectives of preliminary survey for highway alignment? Enumerate the details to be collected and the various steps to be followed in the conventional method. **(08 Marks)**

OR

4 a. Derive an expression for finding the extra widening required on horizontal curve. **(08 Marks)**
   b. The speeds of overtaking and over taken vehicles are 70 kmph and 40 kmph respectively on a two way traffic road. The average acceleration during overtaking may be assumed as 0.99 m/sec^2. Calculate safe overtaking sight distance and show the details of overtaking zone with sketch. **(08 Marks)**

Module-3

5 a. What are the desirable properties of sub grade soil? Enumerate the identification and classification tests of soils. **(08 Marks)**
   b. Design a flexible pavement for a two lane undivided carriage way using the following data: Design CBR value of subgrade 5.0% initial traffic on completion of construction is 300 C.V/day. Average growth rate is 6.0% per year. Design life is 10 years VDF value is 2.5. Lane distribution factor is 0.75. **(08 Marks)**
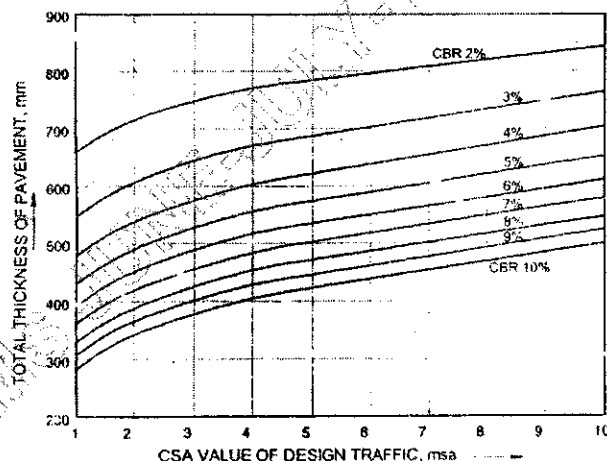

Fig.5(b) CBR design chart for determination of total pavement thickness for traffic with CSA of 1.0 to 10 msa.

OR

6 a. What are the desirable properties of road aggregates? What tests are conducted for judging the desirable properties? Mention the significance of each test. **(08 Marks)**

b. A plate load test was conducted on a soaked sub grade during monsoon using a plate diameter of 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of sub grade reaction for the standard plate. **(08 Marks)**

Mean settlement values, mm	0.0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load values kg	0.0	460	900	1180	1360	1480	1590	1640

Module-4

7 a. What are the desirable properties of Bituminous mixes? Discuss briefly. **(08 Marks)**

b. What are the essential requirements of soil properties suitable for the construction of highway sub grade? Explain the method of construction of highway sub grade. **(08 Marks)**

OR

8 a. Explain the method of construction of water Bound Macadam base. **(08 Marks)**

b. What are the functions of granular material sub base? Explain the construction method of granular sub base. **(08 Marks)**

Module-5

9 a. Discuss the importance of highway drainage. **(08 Marks)**

b. The maximum quantity of water expected in longitudinal drains on clayey soil is 0.9 m^3/sec. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02. **(08 Marks)**

OR

10 a. Discuss the various components of quantifiable and non-quantifiable benefits to the road users due to highway development project. **(08 Marks)**

b. Calculate the annual cost of a stretch of highway from the following particulars:

Item	Total cost lakhs	Estimated life years	Rate of interest
Land	35.0	100	6%
Earthwork	40.0	40	8%
Bridges, culverts, drainage	50.0	60	8%
Pavement	100.0	15	10%
Traffic signs and road appurtenance	15.0	5	10%

The average cost of maintenance of the road is Rs.1.5 lakhs per year. **(08 Marks)**

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