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Fifth Semester B.E. Degree Examination, June/July 2018
Transportation Engineering – I

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Missing data if any, may suitably be assumed.

PART – A

- 1 a. Briefly explain the various characteristics of road transport. (06 Marks)
b. Write a brief note on Jayakar committee. (06 Marks)
c. What is master plan? How the road development programme is phased by saturation system? (08 Marks)
- 2 a. Briefly explain the various types of roads. (06 Marks)
b. Write a brief note on “Karnataka Road Development Corporation Limited”. (06 Marks)
c. What are the highlights of VISION : 2021 document? (08 Marks)
- 3 a. Briefly explain the factors affecting the alignment of roads in plain and rolling terrain. (06 Marks)
b. Write the equation for stopping sight distance on grades and explain the terms. Find the SSD required for a National Highway in plain terrain having an upgrade of 3%. Make suitable assumptions. (06 Marks)
c. Find the overtaking sight distance for a design speed of 65 kmph assuming the acceleration of overtaking vehicle as 3.25 kmph/s. Make suitable assumptions. Sketch the overtaking zone and indicate the specifications. (08 Marks)
- 4 a. Design the superelevation for the design speed of 100 kmph on a curve of radius 342 m. Assume mixed traffic condition. (06 Marks)
b. What is gradient and how is it expressed? Explain ruling and limiting gradients with recommended values in plain terrain. (06 Marks)
c. A valley curve is formed by a descending gradient of 1 in 40, which meets an ascending gradient of 1 in 30. Design the length of valley curve for the design speed of 100 kmph to satisfy both “comfort” and “Head Light Sight Distance” conditions. (08 Marks)

PART – B

- 5 a. A subgrade soil has 55% fines passing 75-micron is sieve, liquid limit of 50% and plasticity index of 9%. Find the group index of soil. Classify the soil as per HRB system and rate it as subgrade material. (06 Marks)
b. Briefly explain the desirable properties of coarse aggregates. Also indicate the tests to assess these properties. (06 Marks)
c. What do you understand by the terms: (i) Cutback and (ii) Emulsion? Distinguish between Bitumen and Tar. (08 Marks)

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- 6 a. Briefly explain the factors affecting the design and performance of pavements. (06 Marks)
 b. Briefly explain the steps involved in the design of flexible pavement by CBR method as per IRC:37-2001. (06 Marks)
 c. Calculate the load stresses at critical regions of a concrete pavement slab by Westergaard's equations using the following data:
 Modulus of elasticity of concrete = 3×10^5 kg/cm²
 Poisson's ratio for concrete = 0.15
 Thickness of concrete pavement slab = 30 cm
 Modulus of subgrade reaction = 10 kg/cm³
 Design wheel load = 5100 kg
 Radius of contact area = 15 cm. (08 Marks)
- 7 a. Explain the construction steps for "Wet Mix Macadam" base. (06 Marks)
 b. Give the construction steps for "Dry Lean Concrete Subbase". (06 Marks)
 c. Explain the significance of highway drainage. (08 Marks)
- 8 a. Briefly explain the various factors affecting the "Vehicle Operation Cost". (06 Marks)
 b. Explain highway financing by BOT and BOOT concepts. (06 Marks)
 c. Determine the relative economics of two types of flexible pavements by "Annual cost method" from the following data: (08 Marks)

Details	Pavement 1	Pavement 2
Total cost per km, Rs. in lakhs	6.20	3.30
Design life, years	12	5
Annual rate of interest %	9	10
Salvage value after design life, Rs. in Lakhs	3.0	2.1
Average annual maintenance cost/km Rs. in Lakhs	0.2	0.4