Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Transportation Engineering (Roads and Railways)

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
at least TWO questions from each part.
2. Write suitable sketches wherever necessary.
3. Use of IRC – 37 and IRC – 58 design charts are permitted.

PART – A

1 a. Explain the characteristics of road transport.   **(08 Marks)**
   b. What are the different modes of transportation? Bring out the comparison between each mode.   **(06 Marks)**
   c. What are the recommendation of Jayakar Committee? Explain the implementations of these recommendations.   **(06 Marks)**

2 a. Explain briefly various types of classification of roads.   **(08 Marks)**
   b. Define Saturation system and Master plan.   **(04 Marks)**
   c. 3 new roads A, B and C are to be completed in a district during a five year plan period. Work out the order of priority for phasing a plan programme by maximum utility principle. Adopt utility of 1.0 for serving a village with population range of 2000 to 5000, for catering of 1000t of agricultural product / 100t of industrial products.

Road	Length km	No. of village served population			Productivity in 1000 tones	
		< 2000	2000 -5000	> 5000	Agr.	Ind.
A	15	10	8	3	15	1.2
B	12	16	3	1	11	0.0
C	18	20	10	2	20	0.8

(08 Marks)

3 a. List out the factors affecting the geometric design of a road. Explain any two in detail.
                                                                                        (10 Marks)
   b. List out and briefly explain the engineering surveys to be conducted for a new alignment.
                                                                                        (06 Marks)
   c. Design the rate of superelevation for a horizontal highway curve of radius 500m and speed 100kmph.   **(04 Marks)**

4 a. Design the pavement slab thickness by IRC method using following data:
      Modulus of subgrade reaction = 8 kg/cm^3 ;   Present traffic intensity = 1000 cvpd
      Design wheel load,   P = 5100 kg,   Radius of contact area = 15 cm, $\alpha = 10 \times 10^{-6}/°C$,
      $\gamma = 7.5\%$. Assume South Tamilnadu.   **(10 Marks)**
   b. Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westerguard's stress equations. Use the following data: Wheel load, P = 5100 kg, E = 3 × 10^5 kg/cm^2, Pav thickness, h = 18 cm, μ = 0.15, k = 6 kg/cm^3, Radius of contact area, a = 15 cm.   **(10 Marks)**

PART - B

5 a. With a neat sketch, explain the permanent way. Also list out the requirements of an ideal permanent way. **(10 Marks)**

   b. Explain briefly the track stresses in rails, sleepers and Ballasts. **(10 Marks)**

6 a. Mention the requirements of a good ballast. **(08 Marks)**

   b. Mention the functions of sleepers. **(08 Marks)**

   c. Define hauling capacity of a locomotive and mention the factors controlling it. **(04 Marks)**

7 a. Calculate the maximum permissible speed on a curve of high speed B.G. track having :
   i) Degree of the curve = 1°
   ii) Amount of supereleration = 8 cm
   iii) Length of transition curve = 130 m
   iv) Maximum speed of the section likely to be sanctioned = 153 kmph. **(10 Marks)**

   b. Explain briefly about the various gradients used on railway tracks. **(10 Marks)**

8 a. Draw a neat sketch of a left hand turnout and show various parts on it. **(06 Marks)**

   b. Draw a neat sketch of a semaphore type signal and show its various parts. **(06 Marks)**

   c. Write short notes on :
   i) Crossing **(04 Marks)**
   ii) Fouling marks **(04 Marks)**

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