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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. – Civil Engineering

Semester End Examination; Dec. - 2014

Transportation Engineering - I

Time: 3 hrs *Max. Marks: 100*

Note: *Answer any **FIVE** full questions, selecting at least **TWO** full questions from each part.*

PART – A

1. a. Explain the characteristics of road transportation. 6

   b. Explain briefly the important recommendations of jaya kar committe? How these recommendations are implemented. 6

   c. These are four alternative proposals of road plan for a backword district. The details are given below. Justify with reason which proposal is best assuming utility units of population as 0.5, 1.0, 2, 4 and 8 for five population ranges and 1 and 5 per 1000 tonnes of agricultural and industrial products served. 8

Proposal	Road length	No. of towns and villages served with population ranges					Production 1000 t	
	km	C2000	2001-5000	5001-10,000	10001-20,000	>20,000	Agricultural	Industrial
P	500	100	150	40	20	3	150	20
Q	600	200	250	68	28	3	220	25
R	700	270	350	82	36	4	300	35
S	800	280	410	91	41	4	400	42
T	900	290	430	96	44	4	430	42

2. a. Briefly discuss the important factors affecting highway alignment. 6

   b. Explain the important highlights of the vision document of 2021. 8

   c. The area of certain district in India is 13400 km^2 and there are 12 towns as per 1981 census. If the length of existing express way is 100 km, calculate the length of primary, secondary and tertiary road length as per III road development plan. 6

3.a. Define right of way. Explain the factors affecting right of way. 6

   b. Explain the important surface characteristics influencing geometric design. 8

   c. What is camber? What are the objectives of providing camber? When straight and parabolic cambers are preferred? 6

Contd… 2

4.a. Define; i) SSD ii) OSD iii) Extra width at curves. 6

b. The speeds of overtaking and overtaken vehicles are 80 and 60kmph respectively. If the acceleration of overtaking vehicle is 2.5 kmph/s, calculate the safe passing sight distance for one way traffic and two-way traffic. 8

c. Calculate the length of transition curve for a design speed of 80 kmph at a horizontal curve of radius 300 m. Take lane width as single lane having 3.75 m, length of axle = 6.1 m and N = 150. 6

PART – B

5.a. Explain the important properties of sub grade soil. 6

b. Bring out the point of differences between Bitumen and tar. 6

c. Explain the construction steps for bituminous surfacing courses. 8

6. a. What are the requirements of a good highway drainage system? 6

b. Explain with neat sketches how the subsurface drainage system is provided to lower water table and control seepage flow. 6

c. The maximum quantity of water expected in one of the open longitudinal drains on a clayey soil is 0.9 m^3/s. Design the cross section and longitudinal bed slope of a trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0 m and cross slope to be 1V to 1.5 H. The allowable velocity of flow in the drain is 1.2 m/s and Manning's roughness coefficient as 0.02. 8

7. a. Discuss briefly : i) Annual cost method and ii) Benefit cost ratio method 6

b. Discuss briefly highway financing adopted for Indian road projects. 6

c. It is proposed to widen a stretch of a single lane road of length 40 km to two lanes at a total cost of Rs. 6.5 lakhs per km and the rate of interest is 10% per year. The annual cost of maintenance of the existing single lane road is Rs. 7000 per km and that of the improved two lane road is Rs. 9000 per km. The average vehicle operation cost on the existing road is Rs. 1.30 per vehicle – km and that on the improved is estimated to be Rs. 1.15 per vehicle - km. If present traffic is 2000 motor vehicles per day and by the end of 15 years design period the traffic is estimated to be doubled, determine whether the investment on the improvement of the road is economically viable, during the 15 years period. 8

8. a. With a neat sketch, explain the components of bridges. 6

b. What are the factors influencing the selection of site for bridges. 8

c. Briefly explain the classification of bridges based on span. 6

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