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06CV56

# Fifth Semester B.E. Degree Examination, Dec 08 / Jan 09
# Transportation Engineering - I

Time: 3 hrs. Max. Marks:100

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

## PART – A

1 a. What are the characteristics of road transport in comparison with other systems? **(06 Marks)**

b. What are the significant recommendations of Jayahar Committee Report? How this helped in road development in India? **(06 Marks)**

c. Determine the lengths of different categories of roads in a state in India by the year 2001, using the 3rd road development formula and with the following data.
Area of state : 15000 sq. km ; Number of towns : 20 ;
Road Density : 82km/100km$^2$. **(08 Marks)**

2 a. List and explain with neat sketches the various road patterns commonly in use. **(06 Marks)**

b. Explain the various types of surveys to be carried out before planning a highway system for a given area. **(06 Marks)**

c. For the following data of population units of 0.5, 1.0, 2.0 and 1.0 per 1000 tonnes, 500 tonnes and 100 tonnes of agricultural, raw material and industrial products respectively. Find the priority for the following system of roads. **(08 Marks)**

| Proposal | Length in km | Population range | | | Productivity | | |
|---|---|---|---|---|---|---|---|
| | | < 1000 | 1001 - 2000 | > 2000 | Agricultural | Raw Material | Industrial Production |
| A | 25 | 20 | 15 | 25 | 8000 | 4000 | 1000 |
| B | 35 | 30 | 20 | 40 | 6000 | 1000 | 1600 |
| C | 40 | 50 | 20 | 60 | 4500 | 2000 | 3200 |
| D | 30 | 15 | 12 | 30 | 4000 | 6000 | 500 |

3 a. Explain obligatory points. With neat sketches discuss how these control the alignment. **(06 Marks)**

b. List and explain the various factors which control the geometric elements in highway design. **(06 Marks)**

c. Define camber. What are the objects of camber? Discuss the factors on which the camber to be provided depends. Specify the recommended ranges of camber for different types of pavement surfaces. **(08 Marks)**

4 a. Explain with neat sketch the ' P I E V' theory. **(06 Marks)**

b. What is super elevation? Explain the steps for practical design of super elevation. **(06 Marks)**

c. A valley curve is formed by a descending gradient of 1 in 25 meeting an ascending gradient of 1 on 30. Design the total length of valley curve, if the design speed is 100 kmph so as to fulfill comfort conditions and head light sight distance for night driving assuming suitable details. **(08 Marks)**

## PART – B

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

b. List and explain the properties and requirements of road aggregates. Also mention the various tests conducted for judging the suitability of road aggregates. **(08 Marks)**

c. Explain with neat sketch, how the CBR test is conducted in the laboratory. **(08 Marks)**

6 a. Explain with sketches how warping stresses are developed in CC pavements at different locations. **(06 Marks)**

b. Explain 'E S W L' and the concept in the determination of the equivalent wheel load. **(06 Marks)**

c. Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using westergaard's stress equations. Use following data.
Wheel load, P = 5100 kg
Modulus of elasticity of cement concrete, $E = 3.0 \times 10^5$ kg/cm$^2$.
Pavement thickness, h = 18cm
Poisson's ratio of concrete, $\mu = 0.15$.
Modulus of subgrade reaction, $k = 6.0$ kg/cm$^3$.
Radius of contact area, a = 15cm. **(08 Marks)**

7 a. Mention the materials used and explain the construction procedure of W.B.M. **(06 Marks)**

b. Explain briefly step by step construction procedure of Bituminous concrete pavements and also mention the specifications for the material used. **(06 Marks)**

c. With neat sketches, explain how the subsurface drainage system is provided to lower the water table and control seepage flow. **(08 Marks)**

8 a. Write notes on BOT and BOOT concepts. **(06 Marks)**

b. Explain with neat sketches the V.O.C by using charts only. **(06 Marks)**

c. Mention the various types of failures in flexible pavements. Explain the causes. **(08 Marks)**

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