

**INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech VI SEMESTER END EXAMINATIONS (REGULAR) - JULY 2023

Regulation: UG-20

TRANSPORTATION ENGINEERING

Time: 3 Hours

CIVIL ENGINEERING

Max Marks: 70

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Demonstrate various factors affecting highway alignment in hill roads with suitable examples and case studies. [BL: Understand| CO: 1|Marks: 7]
- (b) Determine the length of different categories of roads in a state in India by the year 2001 using third road development concept, the following data given. Total area of the state = 38,500 sq.km
Total number of towns as per 1981 census =72 Overall road density aimed at= 69 km per 100 sq.km area. [BL: Apply| CO: 1|Marks: 7]

MODULE – II

2. (a) Why super elevation is needed on a horizontal curve? Illustrate the concept of road widening on curves with any one field application. [BL: Understand| CO: 2|Marks: 7]
- (b) A vertical summit curve is to be designed when two grades, +1/50 and -1/80 meet on a highway. The stopping sight distance and overtaking sight distance required are 180 and 640 m respectively. But, due to site conditions the length of vertical curve has to be restricted to a maximum value of 500 m if possible. Calculate the length of summit curve needed to fulfil the requirements of
i) SSD ii) OSD or at least ISD and discuss the results [BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) With the help of a case study explain different parking angles. Mention advantages and disadvantages of each one. [BL: Understand| CO: 3|Marks: 7]
- (b) Identify the various aspects to be investigated during parking studies. Compare kerb parking with off-street parking. [BL: Understand| CO: 3|Marks: 7]
4. (a) Mention the objectives of traffic volume studies and discuss various types of traffic signs that are used in a highway. [BL: Understand| CO: 4|Marks: 7]
- (b) A vehicle moving at 40kmph speed was stopped by applying breaks and length of the skid mark was 12.2 m. if average skid resistance of the pavement is known to be 0.70. Determine the break efficiency of the test vehicle [BL: Apply| CO: 4|Marks: 7]

MODULE – IV

5. (a) What are the strength characteristics of soil? Summarize three different tests carried out to determine the abrasion of aggregates. [BL: Understand| CO: 5|Marks: 7]
- (b) List the desirable properties of aggregates to be used in pavement construction. Also specify various tests for judging the suitability of aggregates. [BL: Understand| CO: 5|Marks: 7]
6. (a) Describe the various types of tests conducted on bitumen and explain the test procedure of any one test. [BL: Understand| CO: 5|Marks: 7]
- (b) How to prepare strengthened bitumen for expressways, national highways and state highways? Elaborate. [BL: Understand| CO: 5|Marks: 7]

MODULE – V

7. (a) Explain the reasons for stresses in rigid pavements with neat sketches. Also, give explanation for remedies to solve the issues. [BL: Understand| CO: 6|Marks: 7]
- (b) Design size and spacing of dowel bars at an expansion joint of concrete pavement of thickness 25 cm. The radius of relative stiffness of 80 cm. design wheel load 5000 kg. Load capacity of the dowel system is 40 percent of design wheel load. Joint width is 2.0 cm and the permissible stress in shear, bending and bearing stress in dowel bars are 1000,1400 and 100 kg/cm^2 respectively [BL: Apply| CO: 6|Marks: 7]
8. (a) Classify various failures that occur in the flexible pavement and write the probable causes for the failure and give rectification measures [BL: Understand| CO: 6|Marks: 7]
- (b) Calculate the stresses at interior, edge and corner regions of CC pavement for the following data: Wheel load= 5500 kg, modulus of elasticity is $3 \times 10^5 kg/cm^2$, pavement thickness=20cm, Poisson's ratio of concrete = 0.15, Modulus of subgrade reaction $6kg/cm^3$ and radius of contact area is 12cm. [BL: Apply| CO: 6|Marks: 7]

