

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CE467

Course Name: HIGHWAY PAVEMENT DESIGN

Max. Marks: 100

Duration: 3 Hours

(Use of IRC code & relevant charts is permitted)

PART A

Answer any two full questions, each carries 15 marks.

Marks

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| 1 | a) Compare the merits and demerits of flexible and rigid pavements. | (8) |
| | b) List the factors on which strength characteristics of soil depends on. | (3) |
| | c) Give the concept and brief procedure for Marshall method of mix design | (4) |
| 2 | a) What is meant by the term Modulus of subgrade reaction? How is it determined? | (8) |
| | b) Explain the terms (i) VDF (ii) ESWL | (7) |
| 3 | a) Sketch the different axle configurations commonly adopted in Indian road vehicles. | (7) |
| | b) Determine the EWLF or VDF value of the following axle loads in terms of the standard axle load of 8.16t. (i) LCV with rear axle load of 2.5 t (ii) HCV with rear axle load of 15 t. | (8) |

PART B

Answer any two full questions, each carries 15 marks.

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| 4 | a) List the various methods for design of flexible pavement. | (5) |
| | b) Determine the thickness required for a flexible pavement to sustain a wheel load of 22500 kg with a tyre pressure of 14 kg/cm ² by Burmister two layered system. A plate load test was conducted on subgrade soil and for 0.125cm deflection, the unit pressure on 75cm plate was found to be 0.8kg/cm ² . On a test section of base course 15 cm thick the pressure on the plate was found to be 2.1 kg/cm ² for the deflection of 0.125 cm. | (10) |
| 5 | a) Explain the Concept of CBR and give step by step procedure for design of flexible pavement by CBR method as per IRC recommendations. | (7) |
| | b) .Calculate the group index for the subgrade soil from the following data
Soil portion passing No. 200 Sieve = 60%, Liquid limit of soil = 45%, Plastic limit of soil = 30%. Also design the pavement by group index method. Anticipated traffic condition- medium. | (8) |
| 6 | a) Compare warping stress and frictional stress in rigid pavement. | (7) |

- b) A cement concrete pavement 15cm thick is constructed over a subgrade of $k=7.5\text{kg/cm}^3$. Maximum temperature difference between top and bottom of slab during summer day and night is 12.5°C and during winter is 4°C . Spacing between transverse joint is 5m and between longitudinal joint is 3.5m. Wheel load is 4800kg, radius of loaded area is 14.5cm, $E=3\times 10^5\text{kg/cm}^2$, $\mu=0.15$, $e=10\times 10^{-6}/^\circ\text{C}$. Calculate the worst combination of stresses at edge and corner using IRC method. (8)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Outline the IRC recommendations for determining the thickness of CC pavement (12)
- b) A CC pavement 20 cm thick and 7.5 m width has a longitudinal joint along the centre line. Design the diameter, length and spacing of the tie bars, if the allowable stress in steel is 1400 Kg/cm^2 in tension, allowable bond strength of deformed bars in concrete is 24.6 kg/cm^2 and coefficient of friction is 1.2. assume unit weight of concrete as 2400 kg/cm^2 (4)
- c) Write the steps involved in designing the dimensions and spacing of tie bars as per IRC recommendations (4)
- 8 a) Write any one function of providing dowel bars and tie bars in Cement concrete pavement. (4)
- b) Explain the fatigue behaviour of cement concrete slab considered in the design of rigid pavements as per IRC 58:2002. (6)
- c) Discuss the design procedure of dowel bars as the guidelines of IRC 58: 2002 (10)
- 9 a) What are quality control tests for rigid pavement? (5)
- b) Explain the steps of design of flexible pavement overlay using BBD data. (10)
- c) Explain the structural requirement of flexible pavement. (5)
