

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

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) Draw a neat sketch of flexible pavement cross section and show the component parts. Enumerate the functions and importance of each component parts. | (7) |
| | b) With the help of a graph explain the Rothfutch method of proportioning of soil | (8) |
| 2 | a) What are the desirable properties of subgrade soil, How is the strength of soil tested? | (7) |
| | b) Discuss Burmister's Two Layer Theory stating the assumptions | (8) |
| 3 | a) Discuss the concept of ESWL for dual wheel assembly based on stress criteria. | (8) |
| | b) A flexible pavement of thickness 50 cm is laid over a sub grade. A circular load of radius 16cm with uniform contact pressure, 7 kg/cm ² is applied. Assuming homogeneous elastic layer, determine the deflection of pavement surface under the center of the load. Assume the elastic modulus of the sub grade as well as pavement layer to be 1000 kg/cm ² . | (7) |

PART B

Answer any two full questions, each carries 15 marks.

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| 4 | a) State the concept, advantages and disadvantages of group index method for design of flexible pavement | (5) |
| | b) Using Kansas triaxial method, calculate the thickness of sub base, base and wearing surface course .from following data. Modulus of subgrade, sub base, base and wearing course being 100kg/cm ² , 200kg/cm ² , 400kg/cm ² and 1000kg/cm ² respectively. Given that radius of contact = 15cm, Design deflection = 0.25cm, assume saturation coefficient based on rainfall as 0.5 and traffic coefficient as 2. Wheel load = 4080kg. | (10) |
| 5 | a) Explain how Burmister two layer theory is applied in design of flexible pavements. | (7) |
| | b) What are the factors influencing stresses on rigid pavement? List the assumptions | (8) |

in Westergaard's analysis of rigid pavement.

- 6 a) Define i) Modulus of subgrade reaction ii) radius of relative stiffness iii) equivalent radius of resisting section. (6)
- b) Write a note on critical combination of stresses in rigid pavements. (3)
- c) Determine the warping stress at interior, edge and corner of a rigid pavement with transverse joints at 10m interval and longitudinal joints at 3.75m interval. Temperature differential condition for 4 days is to be $0.6^{\circ}\text{C}/\text{cm}$ slab thickness. Width of slab= 3.75m, Thickness of CC pavement 200mm, Thermal expansion of concrete= $10 \times 10^{-6}/^{\circ}\text{C}$. E of concrete $3 \times 10^5 \text{ kg}/\text{cm}^2$, Modulus of subgrade reaction is $6.9 \text{ kg}/\text{cm}^3$, Radius of loaded area=15cm, Poisson's ratio of concrete is 0.15. (6)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Explain with neat sketches (a) Dummy Joint (b) Contraction joint with dowel bar (c) Contraction joint without dowel bar (15)
- b) Explain the function of longitudinal joints in CC pavements (5)
- 8 a) Outline the steps involved in the design of CC pavement thickness as per : IRC58, 2002 guidelines. (8)
- b) The design thickness of CC pavement is 25cm and the spacing between longitudinal joint is 3.5m. If the allowable tensile stress in concrete during the initial period is $0.8 \text{ kg}/\text{cm}^2$, determine the spacing between the contraction joints in order to prevent random cracking across CC pavement. The unit weight of CC= $2400 \text{ kg}/\text{m}^3$ and the friction coefficient between the membrane supporting layer and bottom of CC slab=1.2. (7)
- c) With neat sketches illustrate dowel group action at the edge of CC pavement. (5)
- 9 a) Explain the methods for structural evaluation of bituminous pavement. (12)
- b) What are the structural and functional requirements of flexible and rigid pavements? (8)
