

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M.TECH DEGREE EXAMINATION, MAY 2016

Civil Engineering

(GEOMECHANICS AND STRUCTURAL ENGINEERING)

04CE6322—ANALYSIS AND DESIGN OF PAVEMENTS

Max. Marks : 60

Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

1. What are the tests to be conducted on the aggregate to check its suitability in pavement construction?
2. What are the component parts of the cement concrete pavement?
3. What is meant by Vehicle Damage Factor?
4. List out the empirical methods used for flexible pavement design.
5. Define the term radius of relative stiffness.
6. What are the various critical load positions in a rigid pavement design?
7. What are tie bars?
8. Why is the use of wide expansion joints avoided in the case of a rigid pavement?

PART B

Each question carries 6 marks

9. It was decided to assign you as an engineer for constructing a pavement for a Local Self Government agency. The pavement has to be constructed over soil with relatively low bearing capacity. What are the design factors you need to consider while designing the flexible pavement for the same?

OR

10. What are the desirable properties of soil sub grade and the tests that are conducted on a soil to determine its suitability for using as a sub grade layer?

11. What are the advantages of providing a rigid pavement over a flexible pavement?

OR

12. Name any three non-conventional methods that could be incorporated in the construction of pavements and explain them briefly.

13. Explain the application of Burmister's three layer theory in the pavement design.

OR

14. Design the thickness of a flexible pavement by Burmister's two layer analysis, for a wheel load of 40kN and a tyre pressure of 0.5 MN/m². The modulus of Elasticity of the pavement material is 150MN/m² and that of subgrade is 30 MN/m².

15. Explain the method of flexible pavement design as per IRC.

OR

16. A subgrade soil sample has the following properties:

Soil passing 0.075mm sieve	=	60%
Liquid Limit	=	55%
Plastic Limit	=	45%

Design the pavement section by GI method for heavy traffic with over 400cv/day.

17. Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following data:

Wheel load = 5100kg

Modulus of Elasticity of cement concrete = $3.0 \times 10^5 \text{ kg/cm}^2$

Pavement thickness = 18cm

Poisson's ratio of concrete = 0.15

Modulus of subgrade reaction = 6.0 kg/cm^3

Radius of contact = 15 cm

OR

18. Explain the critical locations of loading as regards wheel load stresses in cement concrete pavement.
19. The width of expansion joint gap is 2.5 cm in a CC pavement. If the laying temperature is 10°C and the maximum slab temperature in summer is 54°C , calculate the spacing between expansion joints. Assume coefficient of thermal expansion of concrete as 10×10^{-6} per $^\circ\text{C}$.

OR

20. Explain the effect due to expansion and contraction of CC slab and the types of stresses induced.