G 834 (Pages : 2) Reg. No.....

Name.....

# B.TECH. DEGREE EXAMINATION, MAY 2014

**Eighth Semester**

Branch : Civil Engineering

HIGHWAYS AND AIRFIELD PAVEMENTS (ELECTIVE II) (C)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Assume suitable data if necessary.



Time : Three Hours Maximum : 100 Marks

## Part A

*Answer* **all** *questions.*
*Each question carries* 4 *marks.*

1. Explain the different types of pavements and their components with figures.
2. How does climatic variations affect the pavement design and performance ?
3. Explain ESWL and the concept in the determination of equivalent load.
4. Discuss the advantages and limitations of CBR method of design.
5. Write a note on stresses in rigid pavements.
6. What are the advantages of Bradbury's stress coefficient and other load stress charts ?
7. Describe warping stresses and friction stresses.
8. Explain the design considerations for spacing of contraction joints with and without reinforcement.
9. Discuss pavement distress.
10. Briefly explain structural evaluation of pavements.

(10 × 4 = 40 marks)

## Part B

*Answer* **all** *questions.*
*Each question carries* 12 *marks.*

11. (a) Discuss briefly the design factors considered for the design of pavements.

*Or*

(b) Explain the various methods of assessment of subgrade soil strength for pavement design.

12. (a) What is the basis on which thickness of pavement is determined based on GI ? What are the assumptions involved in the use of this design approach? Also enumerate the limitations of this method.

*Or*

**Turn over**

(b) Explain Burmister's 2-layer and 3-layer theory.

(c) The plate - bearing test conducted with a 30 mm. diameter plate on a subgrade, sustained a load of 1500 kg. at 0.25 cm. deflection. The test when carried out on a base course of thickness 18 cm. sustained a load of 5500 kg. at 0.25 cm. deflection. Design the pavement section for a wheel load of 5500 kg. with tyre pressure of 7.5 kg/cm$^2$ using Burmister's approach.

13. (a) Explain and give the significance of :—

(i) radius of relative stiffness and ;

(ii) Radius of resisting section

(b) What is Westergaard's concept of temperature stresses in concrete pavements ?

*Or*

(c) Calculate the stresses at interior, edge and corner of a CC pavement by Westergaard's stress equations. Given :

(i) E of concrete = $3 \times 10^5$ kg/cm$^2$ ;

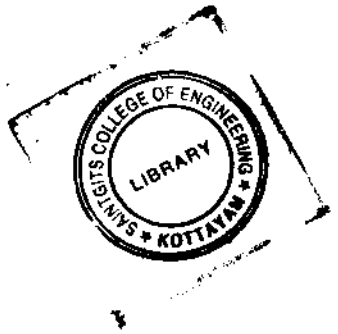
(ii) Poisson's ratio = 0.15

(iii) Thickness of pavement = 18 cm.

(iv) K = 8.5 kg/cm$^2$

(v) Wheel load = 5100 kg and

(vi) Radius of loaded area = 15 cm.




14. (a) What are the functions of dowel bars ?

(b) Design the size and spacing of dowel bars at the expansion joints of a cement concrete slab of 25 cm. thick with radius of relative stiffness 80 cm. for a design load of 5000 kg. Assume a load capacity of dowel bar system as 40 % of the design wheel load. Joint width is 2.0 cm. Permissible shear and flexural stresses in dowel bar are 1000 and 1400 kg/cm$^2$ respectively and permissible bearing stress in cement concrete is 100 kg/cm$^2$.

*Or*

(c) How is the spacing of contraction joints determined ?

(d) Determine the spacing between contraction joints for 3.5 m. slab width having a thickness of 20 cms. The coefficient of friction is 1.5

(i) Allowable tensile stress in concrete = 0.8 kg/cm$^2$

Reinforcement of 10 mm. bars at 30 cm. spacing has been used in the pavement.

15. (a) Explain how we can analyse a flexible pavement failure.

(b) Enumerate rigid pavement deficiencies.

*Or*

(c) Briefly explain Benkelman Beam Deflection.

(d) Write a note on the requirements of a good pavement.

(5 × 12 = 60 marks)