KUMARAGURU
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Register Number:……..

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Seventh Semester

CIVIL ENGINEERING

CEE207 : Pavement Engineering

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Flexible pavement distribute the wheel load

   a) directly to sub grade b) through structural action

   c) through a set of layers to the subgrade d) directly to sub base

2. Find the Modulus of Elasticity (E) in MN/m2 when CBR Value of the soil is 10

   a) 10 MN/m2 b) 100 MN/m2

   c) 1000 MN/m2 d) 10000 MN/m2

3. As per revised IRC guidelines the flexible pavement should be designed as a

   a) Two layer structure b) single layer structure

   c) Four layer structure d) Three layer structure

4. In Water Bound Macadam Rural Roads, the sub base course water absorption percentage should not be more than

   a) 10 % b) 6 %

   c) 8 % d) 4 %

5. As per IRC guidelines the design life for National Highways is

   a) 15 years b) 10 years

   c) 20 years d) 25 years

6. The Modulus of Sub grade Reaction(k_{75}) for 75 cm diameter plate is 10 kg/ cm^2 per cm, then the corresponding Modulus of Sub grade Reaction (k_{30})for 30 cm diameter plate is---

   a) 10 kg/ cm^2 per cm, b) 5 kg/ cm^2 per cm,

   c) 15 kg/ cm^2 per cm, d) 20 kg/ cm^2 per cm,

7. The grade of bitumen binder used for penetration macadam in winter season is --- penetration grade

a) 30/40 b) 60/70

c) 80/100 d) 180/200

8. If the friction factor is 0.44 the skid Number is

a) 88 b) 22

c) 44 d) 66

9. The soil- lime stabilization is one of the best methods for -----

a) black cotton soil b) Sandy soil

c) Silty soil d) Granular soil

10. The most commonly used salt as dust – palliative in India is

a) Sodium chloride b) Barium chloride

c) Calcium chloride d) Zinc chloride

PART B (10 x 2 = 20 Marks)

11. Draw the load distribution pattern of Rigid and Flexible Pavement.
12. Classify the pavements based on structural performance.
13. List the various factors that affect the stability of the pavement.
14. What is fatigue behavior of cement concrete? state the relationship between the fatigue life and stress ratio.
15. Compute the radius of relative stiffness of 15cm thick CC slab when E = $3X10^5$ kg/cm^2 Pisson's ratio = 0.15 , K=7.5 kg/cm^2.
16. Differentiate the terms black topping and white topping.
17. What are the two types of stresses produced by temperature in concrete pavement?
18. What do you understand by the term 'Mud pumping'?
19. What is a sand-clay road?
20. How is the granular soil stabilization carried out in the field?

PART C (5 x 14 = 70 Marks) /

21. a) (i) What are the factors to be considered in the design of pavements? (8)

(ii) Discuss the design specifications of rural roads in India. (6)

(OR)

b) (i) Discuss the concept in the determination of Equivalent Single Wheel Load(ESWL) (8)

(ii) Explain the application of Fourth Power Rule in the pavement design (6)

22. a) (i) Design the thickness of flexible pavement(two lane) for the given data as per IRC (8)

- No. of commercial vehicles per day-900
- Project completion period 3 yrs
- Design life of the project is 20 yrs
- Vehicle damage factor 2.5

- Annual traffic growth rate 9%
- CBR value 5%

(ii) Discuss the merits and demerits of CBR method of flexible pavement design (6)

(OR)

b) (i) A two lane single carriage-way is to be designed for a design life period of 15 years. Total two –way traffic intensity in the year completion of construction is expected to be 2000 commercial vehicles per day. Take Vehicle damage factor=3.0. Lane distribution factor =0.75.Assuming an annual rate of traffic growth as 8%, Find the design traffic expressed as cumulative number of standard axles. (8)

(ii) How will you find CBR of a sub grade soil in the laboratory? (6)

23. a) (i) Calculate the stresses at interior, edge and corner regions of cement concrete pavement using Westergaard's Stress Equation. Take wheel load as 5100kg, Poisson's ratio of concrete as 0.15, modulus of sub grade reaction as 6 kg/cm^3 and radius of the contact area as 15cm,modulus of elasticity of cement concrete as$3x10^5$ kg/cm^2,pavement thickness as 18cm. (8)

(ii) Write a brief note on joints in rigid pavement. (6)

(OR)

b) (i) Write the procedure for the design of Rigid Pavement as per IRC 58/2002 (8)

(ii) What are the functions of reinforcements in a concrete slab? (6)

24. a) (i) Describe the typical failures occurring in the flexible pavements. (8)

(ii) Discuss the Present Serviceability Index (PSI) concept developed in the AASHO Test. (6)

(OR)

b) (i) What is "Benkelman beam"? Discuss its application in the evaluation of pavements. (8)

(ii) Discuss the routine maintenance works that are required for highways. (6)

25. a) (i) Explain the functions and applications of Geo synthetic materials in the stabilization of pavements. (8)

(ii) .write short notes on : Oiling of earth or gravel roads and use of Wet Mix Macadam in pavement construction. (6)

(OR)

b) (i) Discuss the purpose and types of soil stabilization. (8)

(ii) Write short notes on Geo Grids and its use in roads. (6)

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