10CV833

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Pavement Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO full questions from each part.***

PART – A

1 a. With the help of sketches mention the various layers of flexible and rigid pavements. Write the functions of each layer. **(10 Marks)**

b. Distinguish between highway pavement and airfield pavement. **(10 Marks)**

2 a. State assumptions and limitations of Boussinesq's theory. **(06 Marks)**

b. Find the vertical stress distribution in a homogeneous pavement upto a depth of 60cms. Due to a bullock cart with wheel load 600kg on a vertical plane.

i) Along the line of action of load.

ii) 5cm away from the line of action of load. **(14 Marks)**

3 a. Explain the ESWL concept with neat figure. **(08 Marks)**

b. Find the ESWL by graphical method for a dual wheel load assembly with 2000kg on each wheel and tyre pressure of 6.5kg/km^2 if the centre to centre spacing between the wheels is 25cm. Consider the pavement thickness of 25cm and 45cm. (Use plain graph paper). **(12 Marks)**

4 a. Design the pavement section by triaxial leansus method using the following data:
Wheel load = 41kN
E-value of subgrade soil = 10N/mm^2
E-value of base course material = 40 N/mm^2
E-value of wearing course = 100 N/mm^2 which is 7.5cm thick
Traffic coefficient = 1.5
Rainfall coefficient = 0.9
Radius of contact area = 150mm
Design deflection = 2.5mm
Sketch the pavement section. **(10 Marks)**

b. Explain the design of flexible pavement by revised CBR method as per IRC quick lines. **(10 Marks)**

PART – B

5 a. Explain the following:

i) Types and objectives of joints in cement concrete pavement.

ii) Critical combination of stress in a CC pavement. **(10 Marks)**

b. A cement concrete pavement has a thickness of 20cms, has 2 lanes of slab width a 3.35m coefficient of friction between slab and subgrade = 1.5. Weight of slab = 480 kg/m^2. Allowable working stress in steel = 1400 kg/km^2. Maximum permissible bond stress,

i) Plain bars, 17.5 kg/km^2.

ii) Deformed bars, 24 kg/cm^2. Design a tie – bar system. **(10 Marks)**

6 a. Explain different types of stresses due to wheel loads. **(10 Marks)**

b. Using the data given below, calculate the wheel load stresses at i) Interior ii) Edge and iii) Corner regions of a cement concrete pavement using Westergaard's stress equation. Also determine the probable location where the crack is likely to develop due to corner loading. Wheel load P = 5100kg, $E_C = 3.0 \times 10^5$ kg/cm^2, Pavement thickness, h = 18cms, Poisson's ratio of concrete = $\mu = 0.15$, K = 6.0 kg/km^3 and radius of contact area, a = 15cm. **(10 Marks)**

7 a. Explain Benkelman Beam deflection method. **(10 Marks)**

b. What are the requirements of airport pavement? **(10 Marks)**

8 a. Explain failures in flexible pavements. **(10 Marks)**

b. Write short notes on: i) Mud pumping ii) Structural cracks. **(10 Marks)**