ROLL NO.	

PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 80 | Max Time: 120 Mins | Weightage: 40 %

ENDTERM FINAL EXAMINATION

I Semester AY 2017-18 | Course: **CIV 301 PAVEMENT DESIGN** | 22 DECEM 2017

Instructions:

i. Write legibly
ii. Scientific and non-programmable calculators are permitted

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Part A

[4 Q x 5 M= 20 Marks]

1. Explain the different types of rigid pavements.

2. With neat sketches explain different types of distress/failures in flexible Pavements (Any Four)

3. With a neat sketch, explain the use of Dowel bars and Tie bars that are used in joints in rigid Pavements

4. Explain with neat sketches different types of joints used in rigid pavements.

Part B

[2 Q x 15 M= 30 Marks]

5. Explain the following terms

   a. Westergaards equations for wheel load stresses
   b. Radius of relative stiffness
   c. Modulus of subgrade reaction

6. Using the data below, calculate the wheel load stresses (a) Interior (b) Edge(c) Corner Regions of a cement concrete pavement using Westergaard's stress equations. Determine the Probable location where the crack is likely to develop due to corner loading

   Wheel load =5200 kg
   Modulus of Elasticity of concrete E = 3.0 x 10^5 kg/cm^2

Pavement Thickness =20cm
Poisson's Ratio of concrete =0.15
Modulus of Subgrade reaction k =6 kg/cm^2
Radius of contact area =15cm

Part C

[2 Q x 15 M= 30 Marks]

7. Design size and spacing of dowel bars at an expansion joint of concrete pavement of thickness 25cm. Given the radius of relative stiffness of 80cm. Design wheel load is 5000kg. Load capacity of the dowel system is 40 % of design wheel load. Joint width is 2cm. The permissible stress in shear,bending and bearing stress in dowel bars are 1000,1400 and 100kg/cm^2

8. Design a rigid pavement making use of Westergaard's wheel load and warping stress equations at edge region of the slab. The design data are given below,Bradburry's warping stress coefficient chart may be used

Design Wheel load P =7000kg
Contact pressure =7.5kg/ cm^2
Spacing between longitudinal joints =3.75m
Spacing between contraction joints =4.2m
Elastic Modulus of Pavement material = E = 3.0 x 10^5 kg/cm^2
Possion's Ratio =0.15
Thermal coefficient of Cement concrete per degree centigrade e = 1 x 10^{-5}/C
Flexural Strength of Concrete =45 kg /cm^2
Modulus (K –value) of base course =30 kg/cm^3

Maximum temperature differential at the location for pavement thickness values of 22,24,26,and 30cm are respectively 14.8℃,15.6℃,16.2℃, 16.8℃

Desired factor of safety with respect to load stress +warping stress at edge region is 1.1 to 1.2

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Max Marks: 20 | Max Time: 60 Minutes | Weightage: 20 %

TEST 2

I Semester AY 2017-2018 | Course: **CIV301 Pavement Design** | 28 OCT 2017

Instructions:

i. Write precisely and legibly
ii. Scientific and non-programmable calculators are permitted
iii. Design chart is provided overleaf

Part A

(2Q x 2.5 M= 05 Marks)

1. Write a brief note on Present Serviceability Test
2. List the Inputs required to be used in the AASHTO(1993) guide equations

Part B

(2Q x 4 M= 08 Marks)

3. Write **any four** differences between Highway pavements and airfield pavements

4. Design the thickness of a flexible pavement by Burmister two layer analysis for a wheel load of 35kN and a tyre pressure of 0.5MN/m^2. The Modulus of elasticity of the pavement material is 150kN/m^2 and that of the subgrade is 30kN/m^2.

Part C

(1Q x 07 M= 07 Marks)

5. Plate bearing tests were conducted with a 75cm diameter plate on a soil subgrade and a granular base. The stress noticed, when the deflection was 0.25cm on the subgrade soil was 0.08MN/m^2. On the base course same plate yielded 0.25cm deflection under a stress of 0.16MN/m^2 . Design the pavement for an allowable deflection of 0.5cm,under a wheel load of 42 kN and a tyre pressure of 0.5MN/m^2

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Max Marks: 20 | Max Time: 60 Mins | Weightage: 20 %

TEST 1

I Semester 2017-2018 | Course: **CIV301 Pavement Design** | 22 SEPT 2017

Instructions:

i. Write legibly
ii. Scientific and non-programmable calculators are permitted
iii. Design charts attested by COE may be
iv. Assume data if necessary

Part A

(2Q x 2.5 M= 05 Marks)

1. Draw a neat diagram of various layers of conventional flexible pavements with specific layer names and dimensions

2. Explain axle configuration and draw the neat sketch **of dual axle** configuration

Part B

(2 Q x 4 M= 08 Marks)

3. A four lane undivided single carriageway is at presently carrying traffic of 1200 CVPD. It is to be strengthened for the growing traffic needs. The VDF is taken as 3.0. The rate of growth of traffic is 10% per annum. The period of construction is 6 years. The pavement is to be designed for 20 years after completion of work. Calculate the Cumulative standard axles to be used in the design

4. Write the different tests conducted to evaluate the strength of the subgrade and explain briefly Procedure of calculating CBR Value

Part C

(1 Q x 07 M= 07 Marks)

5. The initial traffic after completion of construction of a four lane divided highway is estimated to be 4500 CVPD. Design the flexible pavement for a life of 15 years using the data given
Design CBR value =8 % growth rate of commercial vehicles =7 % Average VDF =4.0.
Sketch indicative of the thickness of layers as per IRC 37:2001 design should be presented