Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech
PCCI 4303

Fifth Semester Back Examination – 2014

ADVANCED MECHANICS OF MATERIALS

BRANCH : CIVIL

QUESTION CODE : L246

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) State two reasons for unsymmetrical bending.

   (b) What do you mean by strain rosette ?

   (c) Draw the stress strain curve for mild steel showing the salient features.

   (d) Write the equation of equilibrium for a three dimensional elastic body.

   (e) How thick cylinder differs from a thin cylinder ?

   (f) Write the assumptions made in deriving the Winkler-Bach equation for curved beam.

   (g) State stress optic law.

   (h) State maximum principal stress theory.

   (i) Explain fatigue in metals.

   (j) Differentiate between Isoclinic and Isochromatic fringe pattern.

2. If the principal stresses at a point in an elastic material are 4f tensile, 2.5f tensile and 1.5f compressive, calculate the value of f at failure according to five different theories of failure. The elastic limit in simple tension is 210 N/mm^2 and μ=0.3. 10

3. A central horizontal section of hook is a symmetrical trapezium 90 mm deep, the inner width being 80 mm and outer being 40 mm. Estimate the extreme intensities of stress when the hook carries a load of 45 KN, the load line passing 40 mm

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from the inside edge of the section and the centre of curvature being in the load line. Plot the stress distribution across the section. 10

4. Define shear centre. Locate the shear centre for an unequal I section. 10

5. A thick cylinder with internal diameter 150 mm and external diameter 300 mm is fixed on the outer circumference. Determine the stresses at outside and inside surface if it is subjected to an internal fluid pressure of 120 KN/mm^2. Assume $\mu = 0.3$. 10

6. Derive the equation of equilibrium and compatibility for a three dimensional elastic body. 10

7. Discuss any five theories of failure and compare graphically. 10

8. Write notes on any **two** : 5×2

   (a) Resistance strain gauge

   (b) Compound cylinder

   (c) Airy's stress function.