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

Total number of printed pages – 3

B. Tech

PCCI 4303

Fifth Semester Examination – 2013

ADVANCED MECHANICS OF MATERIALS

BRANCH : CIVIL

QUESTION CODE : C-314

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) Differentiate between symmetrical and unsymmetrical bending.

   (b) Define shear centre.

   (c) State strain energy theory.

   (d) What do you mean by compound cylinder ?

   (e) Write the equation to find stress in a curved beam.

   (f) Differentiate between thick and thin cylinder.

   (g) What do you mean by isoclinic ?

   (h) Compare all the theories of failure graphically.

   (i) Write the formula to find out the principal strains using a 45 degree strain rosette.

   (j) Write the assumptions made in deriving Winkler-Bach formula for a curved beam.

2. The load on a bolt consists of an axial pull of 15 kN together with a transverse shear of 7.5 kN. Determine the diameter of the bolt according to

   (i) Maximum shear stress theory

   (ii) Maximum strain theory

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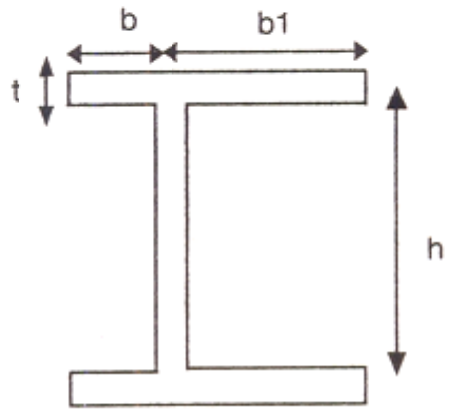
(iii) Strain energy theory

(iv) Shear strain energy theory

Elastic limit in tension is 285N/m^2 and a factor of safety of 3 is to be applied. 10

3. Find out the shear centre for the following I section : 10



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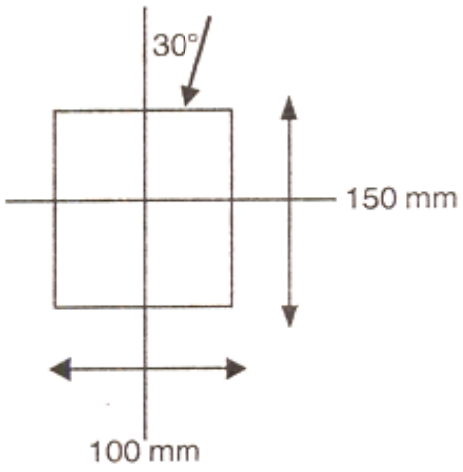
4. Derive the equation of compatibility for a three-dimensional elastic body. 10

5. A thick metallic cylindrical shell of 150 mm internal diameter is required to withstand an internal pressure of 8N/mm^2. Find the necessary thickness of the shell if the permissible tensile stress in the section is 20 N/mm^2. 10

6. A 100 mm ×150 mm wooden beam as shown in fig. is used to support a uniformly distributed load of 4 kN on a simple span of 3 m.The applied load acts in a plane making an angle of 30 degree with the vertical.Calculate the maximum bending stress at mid span and for the same section, locate the neutral axis. 10



7. At a point in a strained material subjected to plane strain, $e_x = 510 \times 10^{-6}$, $e_y = 165 \times 10^{-6}$ and $\tau_{xy} = 270 \times 10^{-6}$. Determine the following : 10

   (a) Strains for an element rotated through an angle 30°

   (b) Principal strains and principal axes

   (c) Maximum shearing strain

8. Write notes on any **two** of the following : 5×2

   (a) Polariscope

   (b) Strain gauge

   (c) Shear stress theory.

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