5th Semester Regular / Back Examination 2015-16
ADVANCED MECHANICS OF MATERIALS
BRANCH: CIVIL
Time: 3 Hours
Max marks: 70
Q.CODE: T370
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions: (2 x 10)
  a)   What do you mean by fatigue in metals?
  b)   State maximum principal stress theory.
  c)   What will be the nature of hoop stress if a wire is wound over a thick
       cylinder?
  d)   Write the formula for finding bending stress under unsymmetrical
       bending.
  e)   State the nature of stress at the inside surface of a crane hook?
  f)   Define shear centre.
  g)   Explain plane stress condition with example.
  h)   Differentiate between thick and thin cylinder.
  i)   Define stress concentration factor.
  j)   State stress optic law.

Q2   A simply supported rolled steel beam of I section is subjected to a
        concentrated load of 100 KN at the centre over a span of 4m.The load
        is inclined at 20^0 to the vertical. Determine:

  a)   The maximum stress developed in the cross section   (5)

  b)   The maximum deflection   (5)

Q3   A thick cylinder with internal radius of 10cm and external radius of 20 (10)
        cm is subjected to an internal fluid pressure of 100 MPa. Draw the
        variation of radial and hoop stresses in the cylinder wall. Also
        determine the maximum shear stress in the cylinder wall.

Q4 Derive the compatibility equation in terms of stress for an elastic body in two dimension. (10)

Q5 Following unit elongation were measured with a rectangular strain rosette: (10)
$e_0 = 3 \times 10^{-4}$, $e_{45} = -4 \times 10^{-4}$, $e_{90} = 5 \times 10^{-4}$. Determine the principal strain and their directions.

Q6 A closed ring of the mean radiys of curvature 100mm is subjected to a pull of 4 KN. The line of action of the load passes through the centre of the ring. Calculate the maximum tensile and compressive stresses in the material of the ring, if the ring is circular in cross section with a diameter equal to 20mm. (10)

Q7 a) Explain Von mises theory of failure. (5)
  b) Discuss the octahedral stress theory of failure. (5)

Q8 Write notes on(any two) (5 x 2)
  a) Dark field polariscope
  b) Strain gauge
  c) Airy's stress function
  d) Maximum shear stress theory