Registration no: | | | | | | | | | | |

Total Number of Pages: **M.TECH**
CMPC202

2nd Sem Mtech Regular/ Back Examination – 2014-15
ADVANCED STRENGTH OF MATERIALS
BRANCH(S): CAD/CAM
Time: 3 Hours
Max marks: 70
Q.CODE:T211

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 flat plate?
b) Define Prandtls stress function.
c) What is the value of hoop stress in rotating ring?
d) State Saint-Venant's principle.
e) Define Plane stress and plane strain.
f) Define shear centre. What is its importance?
g) What do you mean by unsymmetrical bending? Give an example.
h) State the differential equation of equilibrium in Cartesian coordinates.
i) Define shear flow. Write down the Bredt-Batho formula.
j) What is Westergaard solution for rectangular plates?

Q2 Derive the differential equation of equilibrium in polar co-ordinate for three dimensional problems. (10)

Q3 a) What are the reasons for unsymmetrical bending? Derive the expression for equation of Neutral axis. (5)

b) Derive the expression for strain components in polar co-ordinates. (5)

Q4 A cantilever beam of **I** section (Top Flange and bottom Flange are 30mm×2.5mm), web , (45mm×2mm) is 2.4 mete long is subjected to a load of 200N at the free end. If E = 200 GPa, Calculate: (10)

i) Maximum tensile stress ii) Maximum compressive stress
iii) Deflection due to the load iv) Position of neutral axis.

Q5 Derive the expressions for radial and tangential stresses in solid rotating disc. (10)

Q6 Derive the expression for shear centre considering channel or C section. Determine the position of the shear centre considering equal I section of a beam for given fig.1. (10)

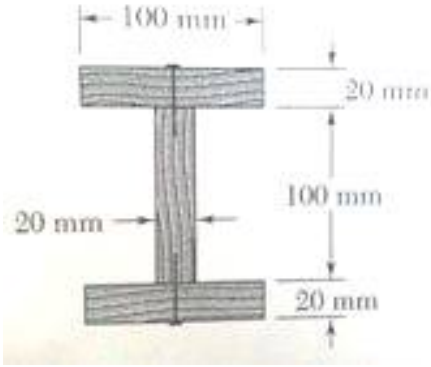

Fig.1

Q7 Fig.2 shows a crane hook lifting a load of 150 KN. Determine the maximum compressive and tensile stresses in the critical section of the crane hook. (10)

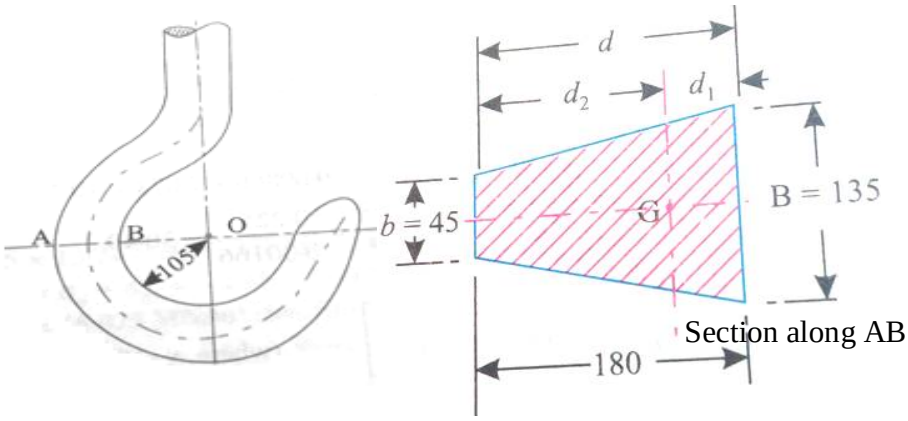

Fig-2

Q8 Write short notes on any two of the following. (5 x 2)

a) Elastic membrane analogy.
b) Generalized Hooke's Law.
c) Compatibility Equation.