* K D - 6 4 2 9 *

KD-6429

B. E. II (Sem. IV) (Chemical) Examination

December – 2012

Strength of Materials - II

Time : 3 Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (Sem. 4) (Chemical)**

Name of the Subject :

☛ **Strength of Materials - 2**

☛Subject Code No. : **6 4 2 9** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.
(3) Assume suitable data if necessary and specifically mention them.
(4) Answer to the two sections must be written in separate answer book.
(5) All dimensions are in mm wherever required.

1 (a) Fill in the blanks : **10**

(i) Stress distribution is _____ in curved bars (Linear/non linear)

(ii) Area under stress-strain curve gives _____. (proof reselience, modulus of reselience)

(iii) Max principal stress theory is also known as Rankine's theory _____. (True/False)

(iv) Stress developed in sudden loading is _____ the stress developed in gradual loading. (Double, half)

(v) Max. principal strain theory is suitable for ductile material _____. (True/False)

(vi) Failure Envelope is a plane _____ to three Mohr's circles at failure in tension, compression, and pure shear. (tangential, normal)

(vii) Temperature at any point in an elastic continuum is a function of _____.

(viii) Expression for total torsional strain energy is _____

(ix) The neutral axis and centroidal axes donet co-inside in a _____ beam. (curved, straight)

(x) In the thin circular disc, with symmetrical temperature variation the temperature varies _____. (Radially circumferentially)

(b) (i) Write statement only of Bett's law. 2

(ii) Find expression for horizontal and vertical deflection for the structure shown in figure-1. 8

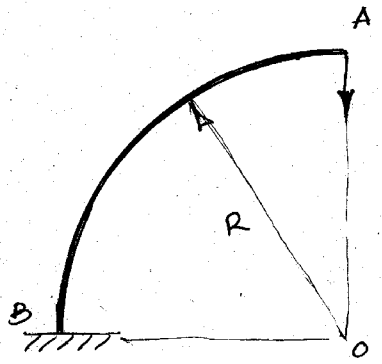

FIGURE- 1

2 (a) Write the differences between straight and curved beams. 5

OR

(a) Write critical stresses in a crane hook. Justify your answer with suitable sketch. 5

(b) Figure-2 shows a circular ring of rectangular section, with a slit and subjected to load P. Calculate the magnitude of the force P if the maximum stress along the section AB is not to exceed 225 MN/m^2. Also plot the stress distribution curve along AB. 10

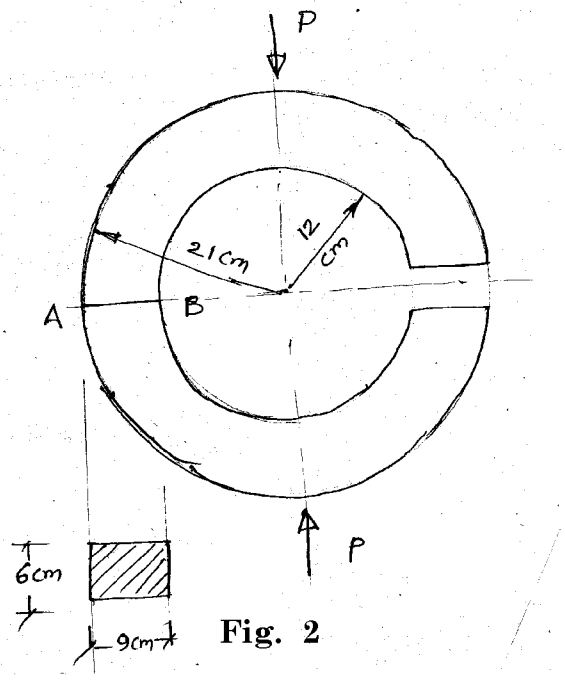

Fig. 2

3 (a) Discuss Mohr's theory of failure and failure envelope. **6**

(b) A mild steel shaft 120 mm diameter is subjected to a maximum torque of 20 kN-m and a maximum bending moment of 12 kN-m at a particular section. Find the factor of safety according to maximum shear stress theory if the elastic limit in simple tension is 220 MN/m^2. **9**

OR

(b) Write critical notes on : (any three) **9**

(i) Thermo-elastic stress strain relationship.

(ii) Maxwell's Reciprocal theorem.

(iii) Differential equations of equilibrium.

(iv) Stress in a chain link.

4 (a) Fill in the blanks : **10**

(i) Butt weld generally acts in _____ or _____. (Tension, Compression, Rotation).

(ii) A thin flat ring is rotating at a speed of V, the circumferential stresses induced is given by _____ $\left(\rho V^2, W\ \rho V^2\right)$

(iii) Efficiency of welded joint is _____ then that of riveted joints. (More, Less)

(iv) _____ is the process of joining two pieces of metal by fusion. (Riveting, Welding)

(v) At the center of the rotating solid disc the radial and circumferential stresses are _____. (maximum, minimum)

(vi) _____ is the ratio of fluid velocity and speed of sound. (Mach number, Reynold's Number)

(vii) The strouhal number is based on _____ and average flow velocity at minimum cross section between tube. (Tube diameter, Ring diameter).

(viii) The radial stress in rotating hollow circular cylinder is maximum at _____. (geometric mean radius diameter).

(ix) Strength of weld is equal to _____ $\left(P \times L \times \sigma t,\ P \times L \times \sigma t \times \delta L\right)$

(x) When the ends of the plate overlap each other, the joint is known as _____. (Lap joint, Butt joint).

(b) Attempt following : **10**

(i) Mach Number

(ii) Vortex Induced Vibration

(iii) Reynold's Number

(iv) Differential equation of equilibrium

OR

(b) Write the advantages and disadvantages of welded connection. **10**

5 Find the maximum load per mm run on the weld for the arrangement shown in figure no. 3 Suggest also suitable size of the weld. **15**

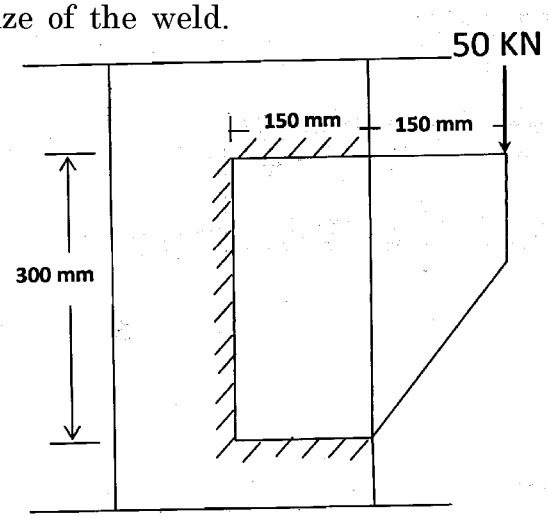

Fig. 3

OR

5 A load of 150 KN is applied to a bracket, fillet welded to a stanchion as shown in figure no. 4. Find the greatest resistance offered by the weld per mm length. Each weld is 150 mm long. **15**

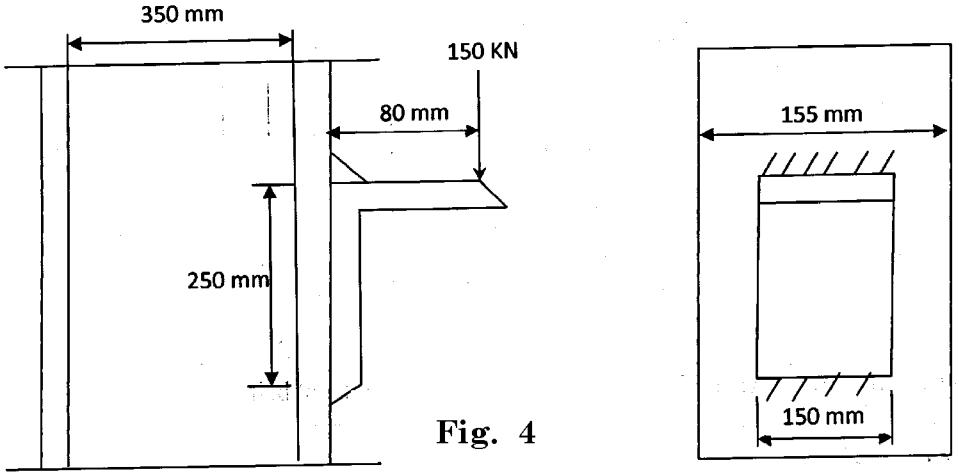

Fig. 4

6 A circular disc of radius 3m has a very small hole at its center. It is rotated at a speed of 800 rpm. Find out the maximum hoop stress developed in it. Take $\mu = 0.30$ and $\rho = 8000$ kg/m^3. **15**

OR

6 (a) Derive an expression for the thickness of disc of uniform strength. **8**

(b) Derive an equation for hoop stress in rotating ring. **7**