

Roll No. ....

**24476****B. Tech. 7th Semester (ME)  
Examination – May, 2015****STRENGTH OF MATERIAL - II****Paper : ME-401-F*****Time : Three Hours ] [ Maximum Marks : 100***

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Question No. 1 is **compulsory**. Attempt any **five** questions by selecting at least **one** question from each Section.

1. (i) Define the Castiglione' Theorem.
- (ii) Define the hoop and longitudinal stress.
- (iii) What is the difference between rotating rim and discs.

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(iv) What is the role of spring ? What are various types of spring ? 20

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### SECTION – A

2. Drive the expression for the strain energy stored in a body when load is applied : 20
- (i) Gradually
  - (ii) Suddeney
  - (iii) Impact
3. Discuss the various theories of elastic failures with derivations and graphical representation. 20

### SECTION – B

4. A steel bar of rectangular sectin 6 cm × 4 cm is arranged as a cantilever projecting horizontally 50 cm beyond the support. The broad face of the bar makes 30° with horizontal A Load of 200 N is hung from the free end. Find out the neutral axis, the horizontal and vertical deflection of free end, maximum tensile stress, E = 200 Gpa. 20

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5. A thin spherical steel shell of mean diameter 1.5 m and thickness 10 mm is subjected to an internal pressure of 2.5 mpa. by mean of pumping oil into it. The pressure is then released. Find out the quantity of oil that would be forced out of shell.  $E_s = 210 \text{ Gpa}$ .  $\nu = 0.3$  and bulk modulus of water  $K = 3.5 \text{ Gpa}$ . 20

### SECTION - C

6. A Cylinder consists of an outer tube of internal and external diameter of 16 cm and 18 cm respectively shrunk on to an inner tube of internal and external diameters 8 cm and 16.01 cm respectively. The internal pressure developed in the cylinder is 300 Mpa. If  $E = 200 \text{ Gpa}$ , find out the maximum hoop stress developed in each tube. 20
7. A disc with outer radius 15 cm and inner radius 2.5 cm is press-fitted on to a shaft of radius 2.5075 cm. Both member are steel with  $E = 210 \text{ Gpa}$   $\nu = 0.29$  and with densities  $7800 \text{ kg/m}^3$  find out
- stress distribution in the disc at 5000 r.p.m.
  - the sheet for which interference pressure goes to zero.

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8. A ring with mean diameter of 125 mm and a circular cross-section 50 mm in diameter is subjected to a compressive Load of 5 KN. Find out the deflection of the ring along the load line.  $E = 200 \text{ GN/m}^2$ ,  $G = 0.4 E$ .

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9. Drive the expression for the stresses in open coiled helical spring subjected to axial load and twisting couples.

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