

9. What are Helical springs ? Give springs applications. Also discuss the effects of springs when springs are connected in series. 20

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Roll No. ....

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B. Tech. 7th Semester (ME)  
Examination – February, 2022  
STRENGTH OF MATERIAL - II

Paper : ME-401-F

Time : Three Hours ]

[ Maximum Marks : 100

*Please 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 :* Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) Define the Resilience, Proof Resilience and Modulus of Resilience. 5
- (b) What is Circumferential Stress ? 5
- (c) What is Lame's Theory ? 5
- (d) Give the types of springs. 5

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-(P-4)/(Q-9)(22) (4)

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**SECTION - A**

2. A vertical tie fixed rigidly at the top, consists of a steel rod 2.5 m long and 20 mm diameter enclosed throughout in a brass tube 20mm internal diameter and 30 mm external diameter. The rod and casing are fixed together at both ends. The compound rod is suddenly loaded in tension by a weight of 10 kN falling through 3mm before being arrested by the tie.

Calculate the maximum stress in steel and brass. Take  $E_s = 200$  Gpa and  $E_b = 100$  Gpa.

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3. What is the Elastic Failure ? Give the various theories of Elastic Failure.

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**SECTION - B**

4. A beam of T-section (flange : 100 mm x 20 mm; web : 150 mm x 10 mm) is 2.5 meters in length and is simply supported at the ends. It carries a load of 4 kN inclined at 15° to the vertical, and passing through the centroid of the section.

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Calculate :

- (i) Maximum tensile stress
- (ii) Maximum compressive stress

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- (iii) Deflection due to the load and
- (iv) Position of the neutral axis.
- (v) Take  $E = 200$  GN/m<sup>2</sup>

5. A boiler shell of 2 m diameter is made up of mild steel plates of 20 mm thick. The efficiency of the longitudinal and circumferential joints is 70% and 60% respectively. Determine the safe pressure in the boiler, if the permissible tensile stress in the plate section through the rivets is 100 MPa. Also determine the circumferential stress in the plate and longitudinal stress through the rivets.

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**SECTION - C**

6. A cast iron pipe of 400 mm internal diameter and 100 mm thickness carries water under a pressure of 8 N/mm<sup>2</sup>. Determine the maximum and minimum intensities of hoop stress across the section. Also sketch the radial pressure distribution and hoop stress distribution across the section.

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7. Find an expression for the circumferential and radial stresses developed in a rotating solid disc.

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**SECTION - D**

8. A beam of circular section of 20 mm has its centre line curved to a radius of 50 mm. Find the intensity of maximum stresses in the beam, when subjected to a moment of 5 Kn-mmm.

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