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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

Summer Term

SUMMER TERM END TERM EXAMINATION – August 2024

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| **Semester : Summer term** | **Date : 06-08-2024** |
| **Course Code : MEC2011** | **Time : 9.30M AM to 12.30 PM** |
| **Course Name : MECHANICS OF SOLIDS** | **Max Marks : 100** |
| **Program : B.Tech.** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 4M=20M** | | | |
| 1 | Explain the different types of loads with proper sketches. | (CO 1) | [Knowledge] |
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| 2 | Define SFD and BMD with sketches. | (CO 3) | [Knowledge] |
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| 3 | Give a note on Principal stresses and strains. | (CO 2) | [Knowledge] |
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| 4 | What is torsion? write the Torque equation and explain. | (CO 4) | [Knowledge] |
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| 5 | What is coefficient of thermal expansion? Write expression to calculate free thermal expansion. | (CO 1) | [Knowledge] |
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| 6 | Draw theoretical diagram of bending stresses for I and T sections. | (CO 3) | [Knowledge] |
| 7 | What bare cylindrical structures and where are they used? How do you differentiate between thick and thin cylinders? Explain. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Are temperature stress only due to variation in temperature? Explain all the equations with proper units connected with temperature stress measurement. | (CO 1) | [Comprehension] |
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| 9 | Draw a 2-D diagram of a compound stress system and discuss the various stresses induced. | (CO 2) | [Comprehension] |
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| 10 | Draw the SFD and BMD given in Figure below.  D:\AY 2023-24\ODD 23-24\MEC2011 MOS\Images\Endterm fig4.jpeg | (CO 3) | [Application] |
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| 11 | Where is Lame’s equation used? Does it apply to thin cylinders also? Explain all equations connected with both the type of cylinders. | (CO 4) | [Comprehension] |
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| 12 | Draw Stress Strain diagram for a ductile material and explain the salient points. | (CO 1) | [Comprehension |
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| 13 | A beam of an I section 200 mm x 300 mm has a web thickness of 10 mm and flange thickness of 10 mm. It carries a shearing force of 10 kN at a section. Sketch the shear stress distribution across the section. | (CO 3) | [Comprehension] |
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| 14 | A shaft transmits 280 kW power at 160 rpm. Determine, (i) the diameter of a solid shaft to transmit the required power. (ii) the inner and outer diameter of a hollow circular shaft if the ratio of inner to outer diameter is 2/3. And (iii) the % saving in the material on using a hollow shaft instead of solid shaft. Take allowable stress as 80 MPa and density as 78 kN/m3. | (CO 4) | [Application] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 15 | A cantilever is subjected to forces as shown in figure below. Determine the slope and deflections at points b and C. Take EI = 2.1 x 1015 N-mm2  D:\AY 2023-24\Summer Term 24\MEC2011 MOS\Deflection 01.jpeg | (CO 2) | [Application] |
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| 16 | A T section has a flange of 120 mm x 20 mm and a web of 20 mm thickness. The overall length of the T section is 140 mm. This is used as a simply supported beam over a span of 4 meters. It carries a uniformly distributed load of 8kN/m over its entire span. Calculate and sketch the maximum tensile and compressive stresses occurring in the section. Also determine and sketch the shear stress for a shear force of 32 kN. | (CO 3) | [Application] |
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| 17 | A pipe of 400 mm internal diameter and 100 mm thickness contains an internal fluid pressure of 80 N/mm2. Calculate and sketch radial and hoop stress distribution across section.  What equation will be used if it is thin cylinder? Explain. | (CO 4) | [Application] |