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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **ODD SEM 2016** |
| **Code :** | **09CE205 / CE240** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **MECHANICS OF DEFORMABLE BODIES - I** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| **1.** | Define Hooke’s law? | (1) |
| **2.** | Define Young`s Modulus. | (1) |
| **3.** | Define Principal planes. | (1) |
| **4.** | What is the maximum shear stress if the principal stresses are σ1 and σ2. | (1) |
| **5.** | Define point of contraflexure. | (1) |
| **6.** | When a simply supported beam is loaded with uniformly distributed load over the full span, where the maximum shear force will occur? | (1) |
| **7.** | Write the bending equation. | (1) |
| **8.** | Define flexural rigidity. | (1) |
| **9.** | Define stiffness of the spring. | (1) |
| **10.** | What is the power developed by a shaft rotating at a speed of N r.p.m. and subjected to a torque of T Nm? | (1) |

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| **PART B(5 X 3= 15 MARKS)** | | |
| **11.** | Draw the stress-strain diagram of mild steel. | (3) |
| **12.** | Explain different types of supports. | (3) |
| **13.** | Explain different types of beams. | (3) |
| **14.** | State the assumptions made in theory of simple bending. | (3) |
| **15.** | Determine the power transmitted by a 75 mm diameter shaft at 140 rpm at a maximum shear stress of 60 N/mm². | (3) |

**PART C(5 X 15= 75 MARKS)**

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| **16.** | A bar of 30 mm diameter is subjected to a pull of 60kN. The measured extension on gauge length of 200 mm is 0.1 mm and change in diameter is 0.004mm. Calculate   1. Youngs modulus 2. Poisons ratio 3. Bulk modulus | (15) |
|  | (OR) |  |
| **17.** | A compound tube consists of a steel tube 140mm internal diameter and 160mm external diameter and an outer brass tube 160mm internal diameter and 180mm external diameter . The two tubes are of the same length. The compound tube carries an axial compressive load of 900 kN. Determine the load carried by each tube and the decrease in length. The length of each tube is 140mm. The Young`s Modulus of steel and brass are 200GPa and 100GPa respectively. | (15) |
| **18.** | The principal stress at a point across two planes is 120 N/mm2 (tensile) and 60 N/mm2 (tensile). Determine the normal, tangential stress and the resultant stress on a plane inclined at 30o to the axis of minor stresses. | (15) |
|  | (OR) |  |
| **19.** | How do you determine the Principal stresses and maximum shear stress graphically? | (15) |
| **20.** | A simply supported beam is subjected to a combination of loads as shown in figure. Sketch the shear force and bending moment diagrams.  A  20 kN/m  10 kN  4m  4m  2m  B  C  D | (15) |
|  | (OR) |  |
| **21.** | A simply supported beam 6m long carries a point load of 3kN and 6kN at distances of 2m and 4m from the left end. Draw Shear Force and Bending Moment diagrams for the beam. | (15) |
| **22.** | A rectangular beam 200mm deep and 300mm wide is simply supported over a span of 8m. What uniformly distributed load per meter the beam may carry, if the bending stress is not to exceed 120N/mm2. | (15) |
|  | (OR) |  |
| **23.** | A timber beam of rectangular section is to support a load of 20kN uniformly distributed load over a span of 3.6m when beam is simply supported. If the depth of section is to be twice the breath and the stress in the timber is not to exceed 7N/mm2, find the dimensions of cross section. | (15) |
| **24.** | A hollow shaft is to transmit 300kW power at 800 r.p.m. If the shear stress is not to exceed 60N/mm2 and the internal diameter is 0.6 of the external diameter, find the external and internal diameters assuming that the maximum torque is 1.4 times the mean. | (15) |
|  | (OR) |  |
| **25.** | A closed coiled helical spring of 100 mean diameters is made up of 10mm diameter rod and has 20 turns. The spring carries an axial load of 200N. Determine the shearing stress. Taking the modulus of rigidity as 8.4 x 104 N/mm2, determine the deflection when carrying this load. Also calculate the stiffness of the spring and the frequency of free vibration for a mass hanging from it. | (15) |

ALL THE BEST