

Registration No :

--	--	--	--	--	--	--	--	--	--

Total Number of Pages : 02

B.Tech
PME3I101

3rd Semester Regular / Back Examination 2018-19

MECHANICS OF SOLID

BRANCH : MECH

Time : 3 Hours

Max Marks : 100

Q.CODE : E669

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Short Answer Type Questions (Answer All-10) (2 x 10)

- What is proof stress?
- Explain the Principle of Superposition.
- What is Poisson's ratio?
- Define Bulk Modulus.
- What is polar moment of inertia?
- What is Principal strain?
- What is point of contraflexure?
- What is composite beam? What is its utility?
- What is slenderness ratio?
- What do you mean by volumetric strain?

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Define shear stress and explain the principle of shear stress.
- Draw the stress-strain diagram for mild steel and mention the important points.
- Derive the expression for volumetric strain of a thin spherical vessel subjected to internal pressure.
- Explain what you understand by 'beam of uniform strength', and how can it be achieved?
- Draw the Mohr's circle for two perpendicular stress (one is tensile and another is compressive).
- What is flitched beam and what are its advantages?
- Derive the equation of equivalent twisting moment and equivalent bending moment of a shaft subjected to bending moment M and torsion T .
- Compare the weight ratio of hollow shaft and solid shaft subjected to turning moment T .
- What is the Strain energy of a hollow shaft subjected to torsion T ?
- What is Euler's formula? Explain the limitation of it.
- Derive an expression for the stiffness of closely-coiled helical spring subjected to axial load.
- Describe the types of load and types of support in beam subjected to transverse loads.

210 210 210 210 210 210 210 210

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

- 210 210 210 210 210 210 210 210
- Q3** a) Establish the relation between Young's modulus (E), modulus of rigidity (G) and bulk modulus (K). **(12)**
- b) How the thermal stresses developed in composite rods? Explain **(4)**
- Q4** a) A rectangular beam 300 mm deep is simple supported over a span of 4 meters. What UDL per meter the beam may carry, if the allowable bending stress is 120 N/mm^2 ? (Take $I = 8 \times 10^6 \text{ mm}^4$) **(10)**
- b) Explain the distribution of shear stress of a circular cross section beam subjected to transverse load W. **(6)**
- Q5** a) Derive an expression for crippling load for the column, when both of the ends are hinged. **(8)**
- b) Determine the expression for maximum slope and deflection of cantilever beam carrying a concentrated load 'W' at its free end. **(8)**
- Q6** a) A helical spring is made of 6 mm diameter steel wire. The mean diameter of the coil is 12 cm and there are 20 effective turns in it. Find the load that causes a deflection of 25 mm. If the same load is dropped from height of 10 cm on the spring find the deflection and maximum stress induced in the spring. (Take $G_s = 80 \text{ Gpa}$) **(8)**
- b) A hollow shaft of diameter ratio $3/8$ is required to transmit 600 kW at 110 rpm, the maximum torque being 20 % greater than the mean. The shear stress is not exceed to 63 MN/m^2 . And angle of twist in length of 3 meters not to exceed 1.4° . Calculate the required external diameter of shaft. **(8)**
- 210 210 210 210 210 210 210 210
- 210 210 210 210 210 210 210 210
- 210 210 210 210 210 210 210 210
- 210 210 210 210 210 210 210 210
- 210 210 210 210 210 210 210 210
- 210 210 210 210 210 210 210 210