

**III Semester Diploma (Mechanical,-Automobile, Civil, Electrical)  
Examination, August 2011  
ENGINEERING MECHANICS**

Time : 3 Hours

Max. Marks : 75

- Instructions :** 1) Answer *all* questions in Part A and either (a) or (b) of each question in Part – B.  
2) Each question carries 1 (one) mark in Part – A and 12 (twelve) marks in Part – B.

**PART – A**

- I. Answer **all** questions : **(15×1=15)**
- 1) Define Elasticity.
  - 2) Define stress.
  - 3) Define Young's Modulus.
  - 4) Define Centroid.
  - 5) Define thick cylinder.
  - 6) Define thin cylinder.
  - 7) Define strength.
  - 8) Define stiffness of beam.
  - 9) Define neutral axis.
  - 10) List the different types of springs.
  - 11) What is closed coil spring ?
  - 12) Define torsion.

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- 13) Define friction.
- 14) Define beam.
- 15) What is the purpose of spur gear ?

## PART – B

Answer all questions :

(5×12=60)

- 16) a) State and explain the different types of strains.

OR

- b) A circular bar of 40 mm diameter and 600 mm long carries a tensile load of 60 kN. Find the stress, strain and Elongation of the bar.  
Take  $E = 2 \times 10^5 \text{ N/mm}^2$ .

- 17) a) Determine the centroid of an angle section 50 mm × 40 mm × 10 mm thick with its longer arm being placed vertical.

OR

- b) Find the values of  $I_{xx}$  and  $I_{yy}$  of a T – section 240 mm wide and 240 mm deep overall. Both the web and flange are 20 mm thick.

- 18) a) A cantilever 3m long carries a point load of 4 kN at its free end and another Point load of 3 kN at a distance of 1 m from the free end. Draw the shear force and bending moment diagram.

OR

- b) A simply supported beam 7 m span carries a point load of 30 KN at 3 m from left support. Draw the shear force and bending moment diagrams.

- 19) a) A closely coiled helical spring of alloy steel wire of 12 mm diameter having 18 complete turns with the mean coil diameter as 8 mm. Calculate the stiffness of the spring.

Take  $N = 90 \times 10^3 \text{ N/mm}^2$ .

OR

- b) A hollow shaft of external and internal diameter of 160 mm and 100 mm is required to transmit torque from one end to the other. What is the safe torque it can transmit, if the allowable shear stress is  $55 \text{ N/mm}^2$  ?

- 20) a) In a spur gear arrangement, the driver has 50 teth and of 12.5 mm pitch. Find the power transmitted by the gear, if the tangential force on the follower id 5 kN. Take the speed of driver as 150 rpm.

OR

- b) An engine shaft running at 240 rpm is required to drive a machine shaft by means of a belt. The pulley on the engine shaft is of 4 m diameter and that of the machine shaft is of 2 m. if the belt thickness is 10 mm, find the speed of the machine shaft when
- i) there is no slip and
  - ii) there is a slip of 3%.
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