

**B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering) /
BTCLEVI/BTMEVI/BTELVI/BTECVI/BTCSVI**

00990

Term-End Examination

June, 2015

ET-202(A) : ENGINEERING MECHANICS

Time : 3 hours

Maximum Marks : 70

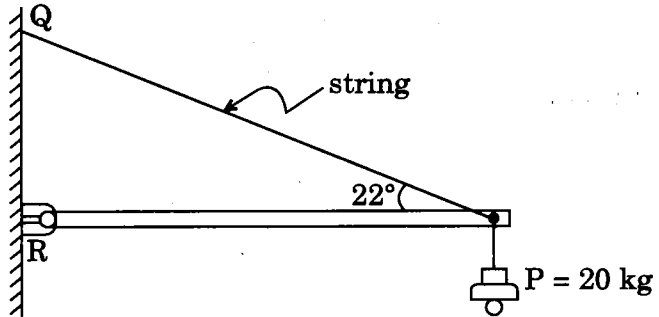
*Note : Answer any **five** questions. Use of scientific calculator is allowed. Assume missing data, if any.*

1. (a) Explain any **two** of the following :

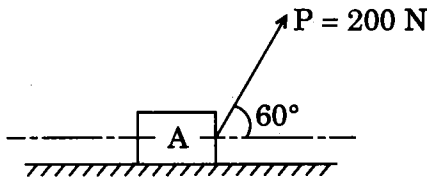
$$2 \times 3 \frac{1}{2} = 7$$

- (i) Law of Parallelogram of Forces
- (ii) Law of Polygon of Forces
- (iii) Space Structures

- (b) An electric light fixture is held with the arrangement shown in the figure. If the weight of the fixture is 20 kg and the hinge is an ideal one, find the axial forces in the bar and the string. 7



2. (a) A force of 200 N inclined at 60° to the horizontal is applied to the block A weighing 400 N. Determine whether block A moves, if the coefficient of friction is 0.5. If not, then find out the maximum value of the coefficient of friction when it is just on the point of moving. 7

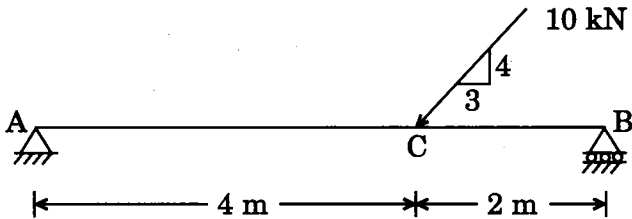


- (b) Explain any *two* of the following with a neat diagram :

$$2 \times 3 \frac{1}{2} = 7$$

- (i) Laws of friction
- (ii) Wedge friction
- (iii) Screw friction

3. (a) Determine the axial moment of inertia of a rectangular area of base b and height d about its centroidal axis and its base. 7
- (b) Derive the moment of inertia of a circular area of radius a about its centroidal axis. 7
4. (a) Draw shear force and bending moment diagram for the simply supported beam subject to the inclined load as shown in the figure. 7



- (b) The angular displacement of a rotating body starting from rest is defined by $\phi(t) = 4t^3 - 3t^2$. Find its angular displacement, angular velocity and angular acceleration at $t = 8$ sec. 7
5. (a) A thread is wound round a heavy homogeneous cylinder of mass m and radius a . The cylinder is allowed to fall from rest and unwind the thread. Find the tension developed in the thread and angular acceleration of the cylinder. 7
- (b) Give the detailed classification of beams. Also explain the sign convention for bending moment. 7

6. (a) What do you understand by stress and strain ? Also explain the stress-strain diagram in detail. 7

(b) What do you understand by compressibility ? Also derive the relationship between modulus of elasticity and modulus of rigidity. 7
