

MODEL QUESTION PAPER
SUB: ENGG.MECHANICS(EME102)
SECTION-A

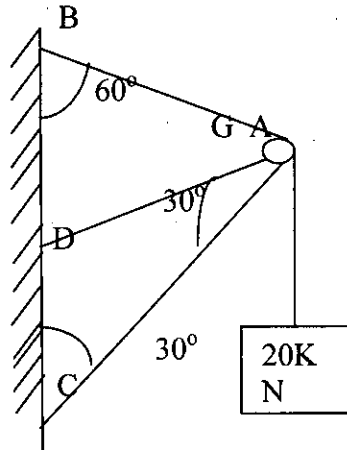
Attempt all question:

- Q.1.If the angle of friction is 30° then the coefficient of friction will be
(A) 0.5 (B) $\sqrt{3}/2$ (C) $1/\sqrt{3}$ (D) $\sqrt{3}$
- Q.2.A simply supported beam of 5 m length under UDL of intensity 50kN/m .The the maximum bending moment.-----
- Q.3.At point of contraflexure
(A) Shear force=0 (B) Bending moment= 0 (C) Bending moment maximum
- Q.4.For smooth surface the coefficient of friction is-----
- Q.5.For strongest section of a beam the section modulus must be maximum. TRUE/FALSE
- Q.6.A cantilever beam load at the free end the bending moment diagram is
(a) Rectangle (b) Triangle (c) parabola (d) None
- Q.7.Total elongation produced in bar of length L area of cross section A due to its own load W is given by-----
- Q.8. J =no of joints and m =no. of members then for perfect truss the condition is -----
- Q.9.Moment of inertia of a triangle about its C.G is----- and about its base is -----
- Q.10.The centre of gravity of semi-circle of radius r is given by -----
- Q.11.The rotational tendency of a force is called-----
- Q.12.Moment of inertia of a rectangle with base 'b' and depth 'd' about its X-X axis is given by-----

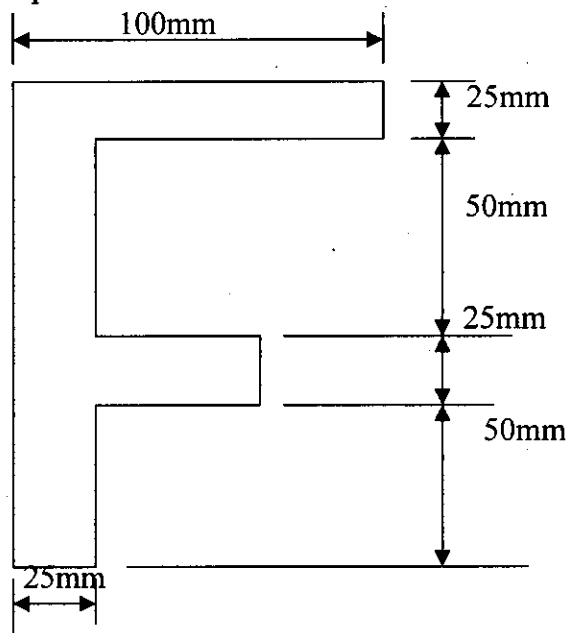
- Q.13.If m = number of member and j =no of joints then the condition of redundant truss is given by-----
-
- Q.14.Lami's theorem can be used for concurrent / non-concurrent force system
- Q.15.The member in a truss under tension is called----- and under compression is called-----
- Q.16. A simply supported beam under point load at the middle of the beam has maximum bending moment at----- and minimum moment at -----
- Q.17.The point at which the bending moment changes its sign is called-----
- Q.18.The C.G. of a solid hemisphere lies on the central radius at a distance of(a) $3r/2$ (b) $3r/4$ (c) $3r/5$
(d) $3r/5$ from the plane of the base
- Q.19.Section modulus of a hollow circular section is -----
- Q.20.The resultant of two equal force of magnitude 'F' acting at an angle of α is with each other is ----

SECTION :B
Attempt any three:

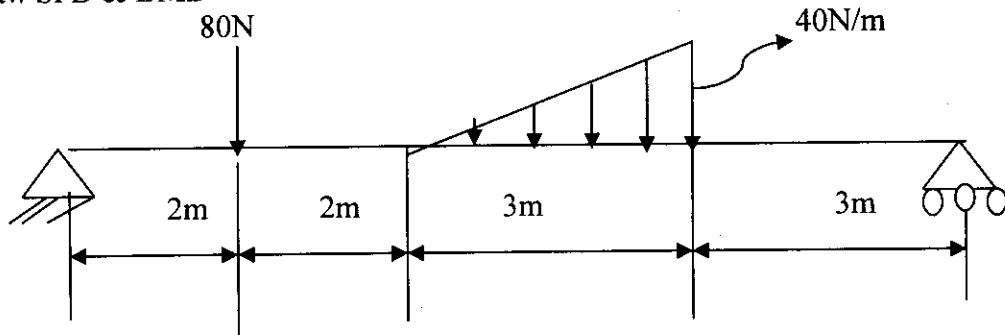
Q.1. Q.1. The frictionless pulley A shown in Fig is supported by two bars AB and AC which are hinged at B and C to a vertical wall. The flexible cable DG hinged at D goes over the pulley and supports a load of 20KN at G. The angles between various members are shown in Fig. Determine the forces in AB and AC. Neglect the size of pulley



Q.2. Q2. Determine by calculation the position of C.G. of the section shown in Fig.2

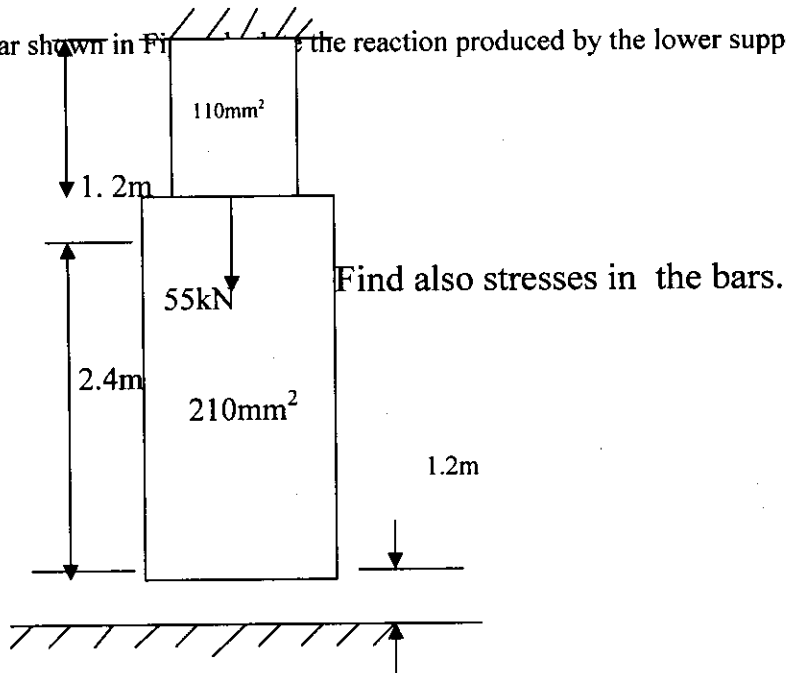


Q.3. Draw SFD & BMD



Q.4. For the bar shown in Fig. find the reaction produced by the lower support on the bar.

$E=200\text{GN/m}^2$



Find also stresses in the bars.

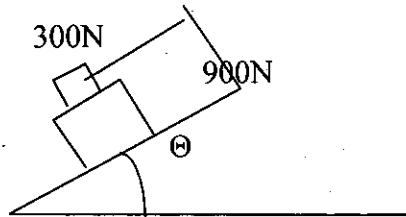
Q.5. A flywheel is rotating at 200rpm and after 10seconds it is rotating at 160rpm. If the retardation is uniform, determine number of revolution made by the flywheel and the time taken by the flywheel before it comes to rest from the speed of 200rpm

SECTION C

Attempt any one from each question

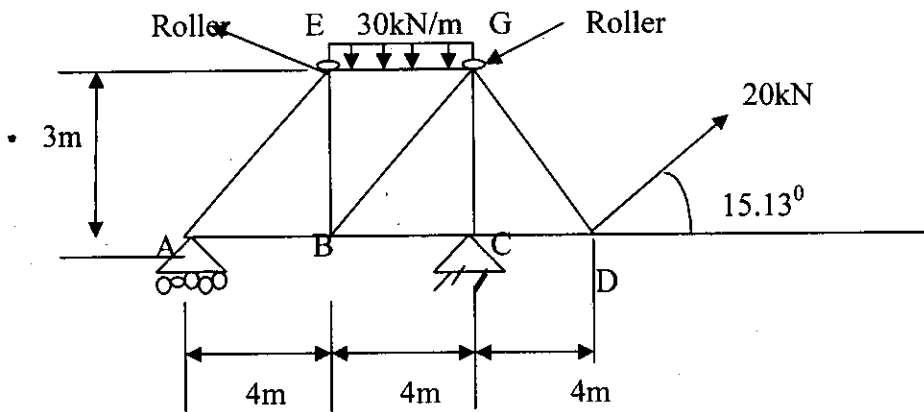
Q.1. (a) write notes on (i) Free body diagram (ii) cone of friction (iii) Conditions on equilibrium (iv) Application of belt friction

(b) What should be the value of θ in Fig given below which will make the motion of 900N block down the plane to impend? Coefficient of friction all contact surfaces is $1/3$



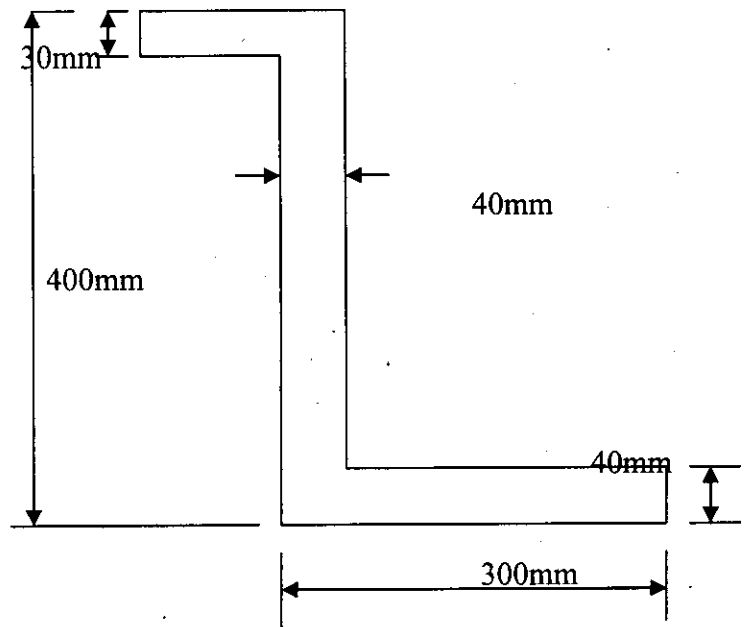
Q.2.(a) Establish the relation between shear force, bending moment and intensity of loading. Explain types of beam and types of load

(b).Determine the forces in members BC,BG, EG & GD of the truss shown in Fig below?

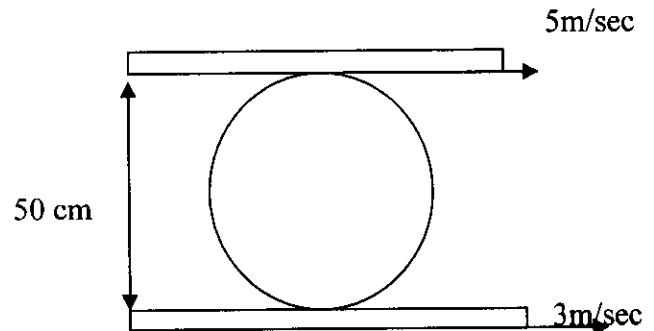


Q.3.(a) Explain perpendicular axis and parallel axis theorem. Differentiate between centroid, centre of gravity and centre of mass

(b) Q5. Find the M.I of Z section about C.G as shown in Fig.



- Q.4. (a) (i) State and explain D'Alembert principle and explain its application.
(ii) Explain different types of plane motion
(b) A cylindrical roller 50 cm in diameter is in contact with two conveyor belts at its top and bottom as shown in Fig. If the belts run at the uniform speed of 5 m/sec and 3 m/sec. Find linear velocity and angular velocity of the roller.



- Q.5. (a) (i) Find the expression of total elongation of a bar due to its own weight
(ii) Find the expression of strain energy due to pure shear and pure torsion
(b) (i) A steel rod of diameter 50 mm and 2.5 m long is subjected to a pull of 100 kN. To what length the rod should be bored centrally so that the total extension will increase by 15% under the same pull, the bore being 25 mm diameter? Take $E=200 \text{ GN/m}^2$ (Ans: $x=1.2 \text{ m}$)
(ii) Calculate the diameter of a circular shaft to transmit 75 kW at 200 rpm. Allowable shear stress is restricted to 50 MN/m^2 and twist 1° in 2 m shaft length. Take $G=400 \text{ GPa}$