Bachelor of Engineering (Computer Science & Engineering)

1st Year 2nd Semester Examination , 2018

Subject : Engineering Mechanics

F. M. -100   Time - 3 hrs

Answer any five questions

1.(a) Refer to Fig. A and find out the moment of the force about OC axis.

(b) Refer to Fig. B and replace the system of forces and moments with a single force and moment to be applied at point A. Check whether they will form a wrench or not.   10 + 10

2 (a) Refer to Fig. C and find out the forces at the pin joint C and also the support reactions at A and B.

Use the concepts of two force member and three force member.

(b) Refer to Fig D and draw the free body diagram of the shaft.   12 +8

3. Refer to Fig E and find out the support reactions at the ball and socket joint and the cable tensions.

OR

Refer to Fig. F and find out the range of P to maintain static equilibrium for the system of blocks.

20

4. (a) Refer to Fig G and find out the centroidal coordinates of the shaded area.

(b) Refer to the shaded T- shaped area (Fig H) and find out the area moment of inertia about the centroidal X axis.   10 + 10

5 (a) Deduce the expressions for acceleration and velocity for a particle moving along a curved path in polar coordinate system.

[Turn over

(b) A projectile is fired at an angle 30 degree with horizontal at a velocity of 100 m/s in the vertical plane. Find out the tangential and normal components of acceleration of the projectile after 5 seconds of firing. Also find out the radius of curvature of the trajectory at that moment.   10 + 10

6. Write short notes on any Four :   4 X 5=20

(a) Pappus Guldinus theorems.

(b) D-Alembert's principle.

(c) Wrench resultant

(d) Polar moment of Inertia

(e) Free Vector and Fixed Vector

Fig A
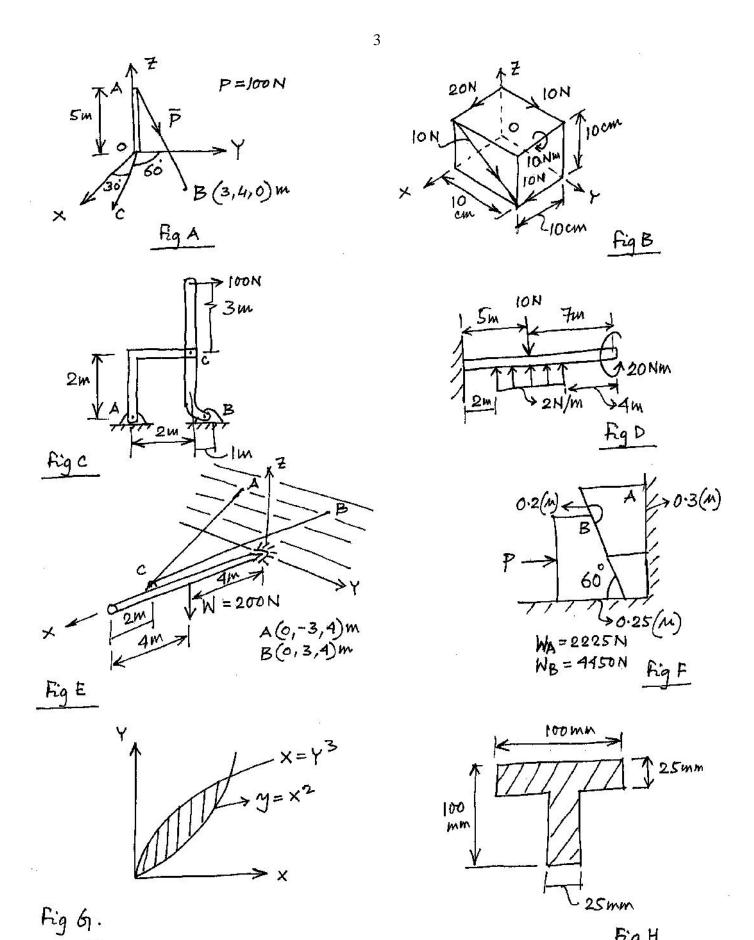
$P = 100N$

$B(3,4,0)m$

fig B

20N   10N

10N

10cm

10Nm

10N

10cm

10cm

fig C

100N

3m

2m

2m

1m

Fig D

10N

5m   7m

20Nm

2m   2N/m   4m

Fig E

$W = 200N$

$A(0,-3,4)m$
$B(0,3,4)m$

4m   2m   4m

fig F

$0.2(m)$ A $0.3(m)$

B

P

$60°$

$0.25(m)$

$W_A = 2225N$
$W_B = 4450N$

Fig G.

$X = Y^3$

$y = x^2$

Fig H

100mm

25mm

100 mm

25mm