



# Sanjay Ghodawat University, Kolhapur

2018-19

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

FY B Tech

FYT 104

DEC 2018

School of Technology

Engineering Mechanics (OLD)

End Semester Examination (ESE)

Semester I

Max Marks: 100

Time: 3 Hrs

Instructions for Students: 1) Use of **non-programmable** calculator is allowed

2) All questions are **compulsory**.

3) Figure to the right indicates **full marks**

4) Draw **neat sketches** wherever necessary

10:00 to 1:00 pm

- |     |   | Marks | COs |
|-----|---|-------|-----|
| Q.1 | a) Explain law of parallelogram of forces   | 06    | CO1 |
|     | b) Forces of 1kN, 2kN, 3kN and 4kN respectively act at one of the angular point of a regular pentagon towards the other four angular points taken in order. Determine the resultant in magnitude and direction. | 10    | CO1 |
| OR  |   |       |     |
|     | b) The angle between the two concurrent forces is $90^\circ$ and their resultant is 2500 N. The resultant makes an angle of $45^\circ$ with one of the force. Determine the magnitude of each force.            | 10    |     |
| Q.2 | a) Explain moment, couples and its characteristics  | 06    | CO2 |
|     | b) For the force system shown in fig.1, find the resultant and its point of application w.r.t. point A along the bar.   | 10    | CO2 |

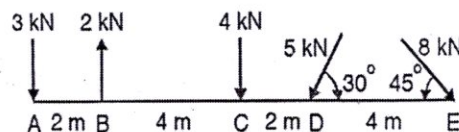


Fig.1

OR

- b) Find coordinates of centroid of given area shown fig.2 10 CO2

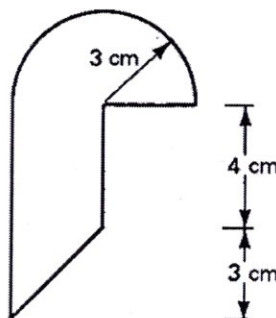


Fig.2

Q.3 a) Define the following

08 CO3

1. Limiting friction

2. Coefficient of friction

3. Angle of friction

4. Angle of repose

b) Determine forces in all member of the truss shown in fig. 3 by any method.

10 CO3

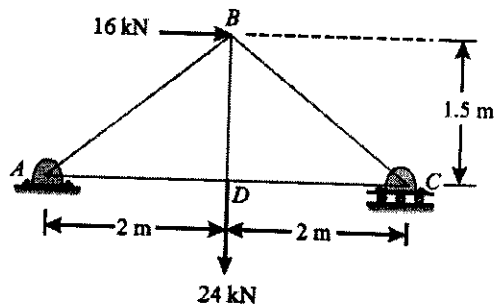


Fig.3

OR

b) Determine M.I. about X-X axis of the shaded area shown in fig. 4.

10 CO3

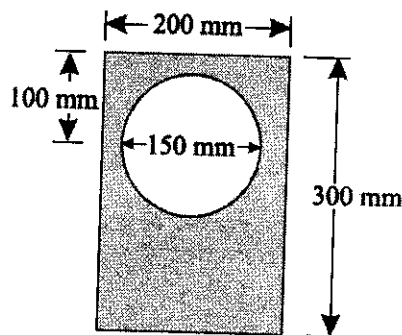


Fig.4

Q.4 a) Explain in detail

06 CO4

1. Dependent Motion

2. Relative motion

b) Block B moves downward with a constant velocity of 20 mm/s. At  $t = 0$ , block A is moving upward with a constant acceleration, and its velocity is 30 mm/s as shown in fig 5. Knowing that at  $t = 3$  sec, slider block C has moved 57 mm to the right, determine, a) velocity of slider block C at  $t = 0$   
b) The acceleration of A and C.

10 CO4

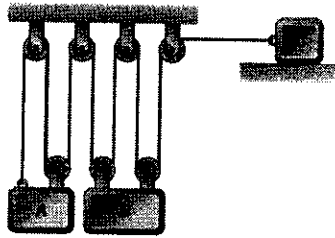


Fig.5

OR

- b) A particle has an initial velocity of 100 m/s upto the right at 300 with horizontal. The component of acceleration are constant at  $a_x = -4 \text{ m/s}^2$  and  $a_y = -20 \text{ m/s}^2$ . Find horizontal distance covered until the particle reaches a point 60m below its original elevation 10 CO4
- Q.5 a) Explain Kepler's laws of planetary motion 08
- b) A body of mass 200kg is initially stationary on a  $15^\circ$  inclined plane. What distance along the incline must the body slide before it reaches a speed of 10m/s? Take coefficient of friction between the body and inclined plane is 0.1. 10 CO5
- Q.6 a) Explain the following terms 06 CO6
1. Principle of work-energy
  2. Principle of impulse-momentum
- b) A pile of 500 kg mass is driven into ground by dropping a hammer freely, having as mass of 318 kg through a height of 2.7 m. If the pile is driven into the ground by 0.15m, calculate the average resistance of the soil. 10 CO6
- OR
- b) The coefficient of restitution between two spheres of masses 1 kg and 5 kg is 0.75. The 1 kg sphere moving with a velocity of 3 m/sec strikes the another sphere moving in the same direction with velocity 60cm/sec. Find the velocities of the two spheres after impact and the loss of K.E. during impact. 10 CO6
- .....