A

Question Paper Code: 93705

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Third Semester

Mechanical Engineering

19UME305– ENGINEERING MECHNANICS

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The unit of weight_____.   CO1- R

    (a) kilogram   (b) Newton   (c) Watt   (d) gram

2. The unit of Power_____.   CO1- R

    (a) Joule   (b) Weber   (c) Watt   (d) Voltage

3. Which one is the unit of Moment?   CO2- R

    (a) N   (b) N-m   (c) N / m2   (d) N / m

4. The Moment of a couple (M) is_____if 'a' is the arm of the couple.   CO2- R

    (a) M = Fa2   (b) M = Fa3   (c) M = F / a   (d) M = F a

5. The point at which the resultant of all_____act is called Centre of   CO3- R
    gravity.

    (a) Perpendicular force   (b) Inclined forces   (c) Parallel forces   (d) All the above

6. The unit of moment of inertia if an area is   CO3- R

    (a) $kg\text{-}m^2$ (b) $kg\text{-}m\text{-}s^2$ (c) kg/m^2 (d) m^4

7. Varignon's theorem is used to find _____   CO4- R

    (a) direction of resultant force   (b) location of resultant force

   (c) Magnitude of resultant force   (d) nature of resultant force

8. The total motion possessed by a body, is called CO4- R

(a) moment (b) mass (c) weight (d) momentum

9. The coefficient of friction depends on CO5- R

(a) Area of contact (b) shape of surfaces

(c) Strength of surfaces (d) nature of surface

10 Frictional force encountered after commencement of motion is called CO5- R

(a) Post friction (b) limiting friction (c) Kinematic friction (d) dynamic friction

PART – B (5 x 2= 10 Marks)

11 Define principle of transmissibility. CO1- R

12 Explain the Type of Support. CO2- U

13 What is uniform motion? CO3- U

14 State D'Alembert's principle CO4- U
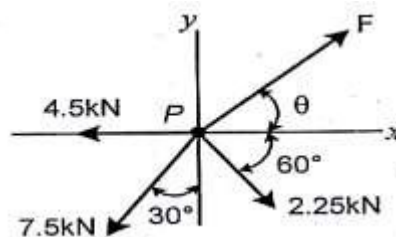
15 What is Rolling Friction? CO5- R

PART – C (5 x 16= 80 Marks)

16 (a) Determine the resultant of the concurrent force system CO1-App (16)
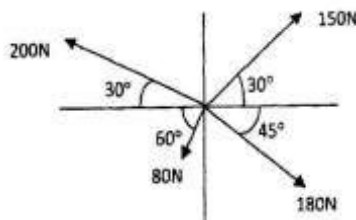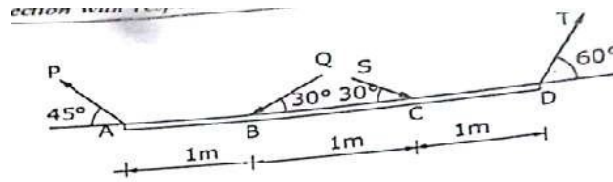

Or

(b) Determine the magnitude and angle and F so that particle shown CO1-App (16)
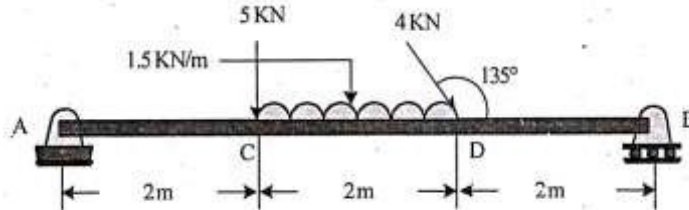in figure, is in Equilibrium.

17 (a) ABCD is a weightless rod under the action of four forces P, Q, S & T If CO2-App (16)
P=10N, Q=4N, S=8N & T=12N, Calculate the resultant and mark the
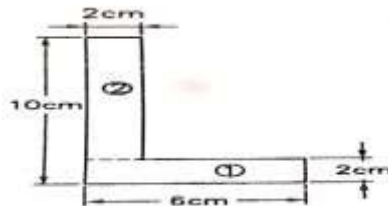same in direction with respect to the end A of the Rod

2

Or

(b) A simply supported beam AB of 6m span is loaded as shown A is a hinged support; B is a roller support. Determine the reactions at A and B. CO2-App (16)
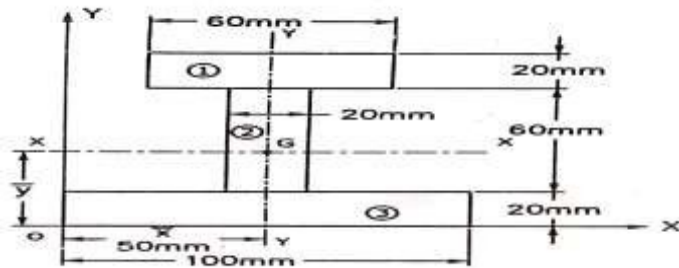

18 (a) Locate the centroid of the L-section. CO3-App (16)

Or

(b) Calculate the Principal Moment of Inertia and Locate the Principal Axes of an unequal I- section about centroid axes. CO3-App (16)


19 (a) A Burgalr's car had a start with acceleration of 2 m/s 2. A police vigilant party came after 5 second and continued to chase the Burgalr's car with a uniform velocity of 20m/s . Find the time taken in which the police van will overtake the Burgalr's car? CO4-App (16)

Or

3

(b) Two weights 80 N and 20 N are connected by a thread and move along a rough horizontal plane under the action of a force 40 N, applied to the first weight of 80 N as shown in figure. The coefficient of friction between the sliding surfaces of the wrights and the plane is 0.3. Design the acceleration of the weights and the tension in the thread using work-energy equation.   CO4-App   (16)
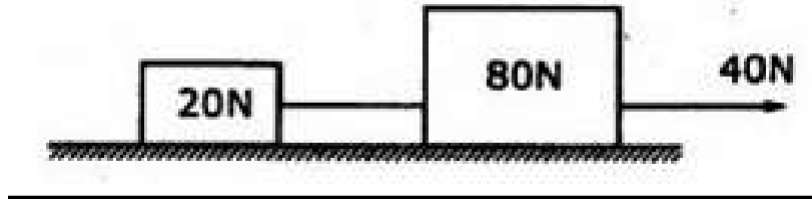
20. (a) A man can pull horizontally with a force of 450N. A mass of 350 kg is resting on a horizontal surface or which the coefficient of friction is 0.20. The vertical cable of a crane is attached to the top of the block as shown in fig 11.8 What will be the tension in the cable if the man is just able to start the block to the right?   CO5-App   (16)
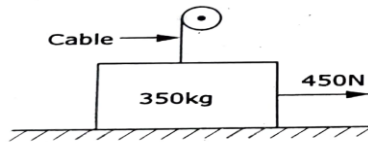
Or

(b) What should be the value of the angle Θ so that motion of the 390N block impends down the plane? The coefficient of friction for all the surfaces is 1/3.

   CO5-App   (16)

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