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Question Paper Code: U3A03

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

Third Semester

Agricultural Engineering

21UAG303 – INTRODUCTION TO ENGINEERING MECHANICS

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The unit of weight _____.   CO2- U

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

2. According to the Newton's First Law, The Resultant R is   CO2- U

    (a) R $\neq$ 0   (b) R = 1   (c) R is infinitive   (d) 0

3. Following is not a scalar quantity ?   CO2- U

    (a) Density   (b) mass   (c) Volume   (d) Acceleration

4. Forces passing through a common point are known as   CO2- U

    (a) collinear forces   (b) Concurrent forces   (c) Multiple forces   (d) Scalar forces

5. Two dimensional element the G is   CO2- U

    (a) Centre of gravity   (b) Centre of the area   (c) Centroid   (d) Cycloid

6. Polar Moment of Inertia follows _____   CO2- U

    (a) Parallel Axis Theorem   (b) Perpendicular Axis Theorem

    (c) Centroidal Axis Theorem   (d) Radius of Gyration

7. Two non-collinear parallel equal forces acting in opposite direction   CO2- U

    (a) Balance each other   (b) constitute a moment

    (c) Constitute a couple   (d) constitute a moment of couple

8. The maximum frictional force increase as the _____force between the bodies CO2- U
    increase.

    (a) Parallel   (b) inclined   (c) normal   (d) gravitational

9. Frictional force encountered after commencement of motion is called   CO2- U

(a) Post friction   (b)Limiting friction   (c)Angle of friction   (d) dynamic friction.

10. Coulomb friction is the friction between   CO2- U

(a) Bodies having relative motion   (b) two dry surfaces

(c) Two lubricated surfaces   (d) solids and liquids

PART – B (5 x 2= 10Marks)

11. Show the free body diagram with example   CO2- U

12. Solve the moment of the 100 N force about point A and B   CO3- App
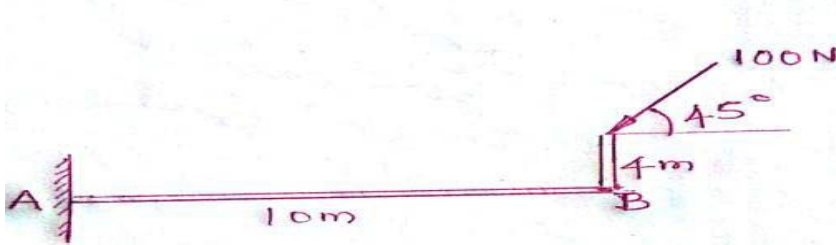
13. Show product of inertia with formula..   CO2- U

14. Compare and contrast the impact and elastic impact.   CO2- U

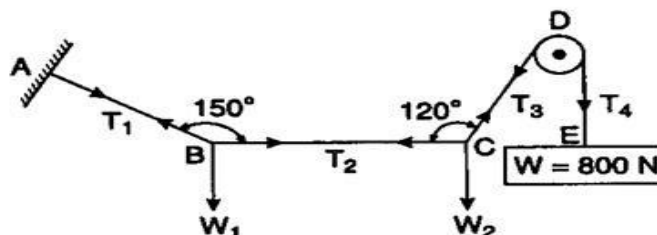15. Illustrate Coulomb's laws of dry friction.   CO2- U

PART – C (5 x 16= 80 Marks)

16. (a) Compute the magnitude and angle and F so that particle shown in   CO3-App   (16)
figure, is in Equilibrium.
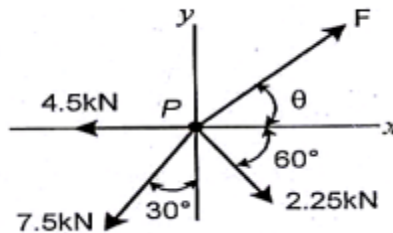
Or

(b) A system of connected flexible cable shown in Figure below is   CO3-App   (16)
supporting two vertical forces W_1, W_2 at points B&C .Manipulate
the forces in various segments of the cable

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17. (a) Two identical rollers, each of weight W = 50N are supported by an inclined plane and a vertical wall as shown in figure below . Solve the reactions at the point of supports .Assume all the surfaces to be smooth. CO3-App (16)
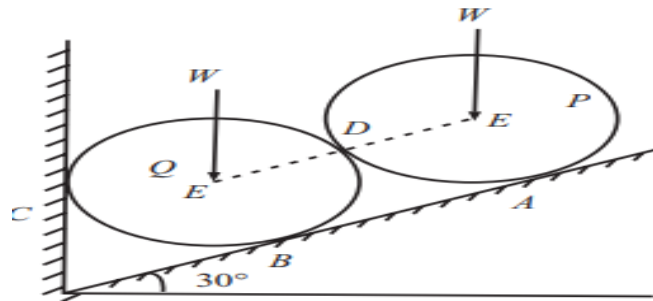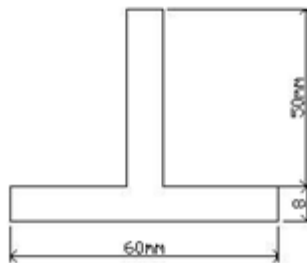

Or

(b) Four forces of magnitude and direction acting on a square ABCD of side 2 m are shown in the figure. Solve the resultant in magnitude and direction and also locate its point of application with respect to the sides AB and AD CO3-App (16)
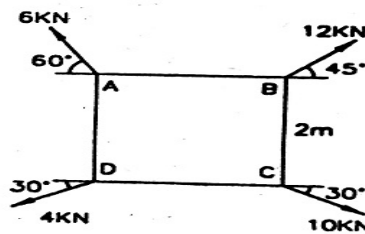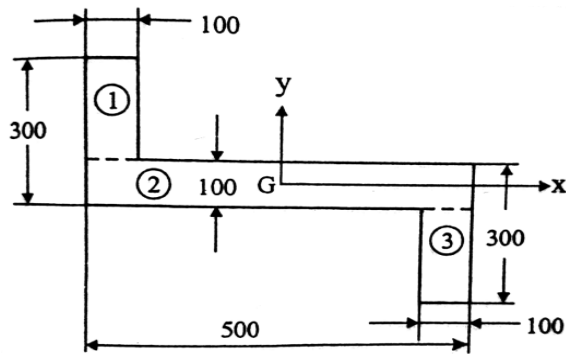

18. (a) Solve the principal moments of inertia and find location of principal axes of surface shown in figure CO3- App (16)

Or

(b) Compute Moment of Inertia about the co-ordinate axes of plane area shown in fig. Also find Polar Moment of Inertia. All the dimensions are in 'mm' CO3- App (16)

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19. (a) A Burgalr's car had a start with acceleration of 2 m/s 2. A police CO3- App (16)
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?

Or

(b) A car is moving with a velocity of 15m/sec. The car is brought to CO3- App (16)
rest by applying brakes in 5 seconds. Determine
(i) The retardation
(ii) Distance travelled by the car after applying brakes.

20. (a) A Uniform ladder of weight 1000 N and length 4 m rests on a CO3- App (16)
horizontal ground and leans against a smoothe vertical wall. The
ladder makes an angle of 60^0 with horizontal , when a man of
weight 750 N stands on the ladder at a distance of 3 m from the top
of the ladder , the ladder is at the point of sliding .Determine the
Coefficient of friction between ladder and the floor.

Or

(b) A uniform ladder of weight 250N and length 7m is placed against a CO3- App (16)
vertical wall in a position where its inclination to the vertical is 30º.
A man weight 800N climbs s the ladder. At what position will be
induce slipping? Take coefficient of friction between the floor and
ladder is µ=0.40 and that between the wall and ladder is µ=0.40.

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