PVP 19

Code: 19ME3301

II B.Tech - I Semester – Regular Examinations – MARCH 2021

ENGINEERING MECHANICS
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place

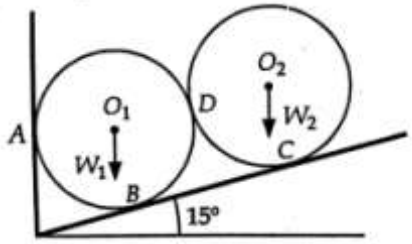
PART – A

1. a) What is a 'free body diagram'?
b) Explain about different types of trusses.
c) State perpendicular axis theorem.
d) A body is moving with a velocity of 2 m/sec. After 4 seconds the velocity of the body becomes 5 m/sec. Find the acceleration of the body.
e) Define the terms impulse and momentum.

PART – B

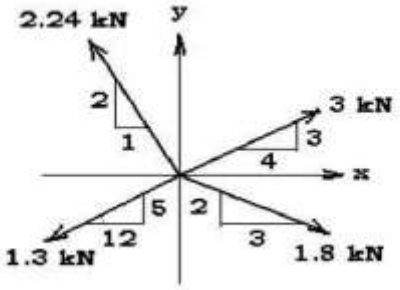
UNIT – I

2. a) State and prove Varignon's theorem. 6 M
b) Two rollers of the same diameter are supported by an inclined plane and a vertical wall as shown in figure. The upper and the lower rollers are respectively 200N and 250N in weight. Assuming smooth surfaces, find the reactions induced at the points of supports A, B, C and D. 6 M



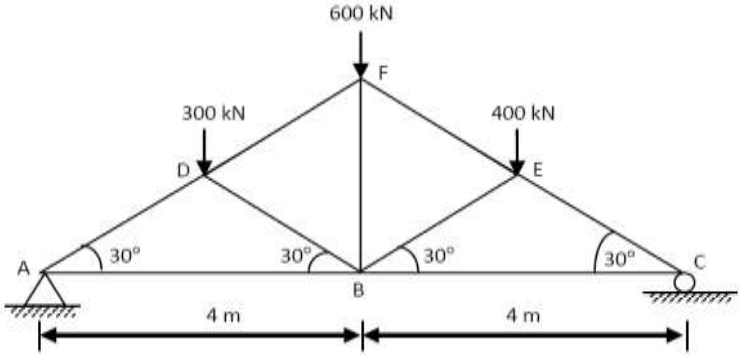
OR

3. The body shown in figure is acted on by four forces. Determine the resultant. 12M



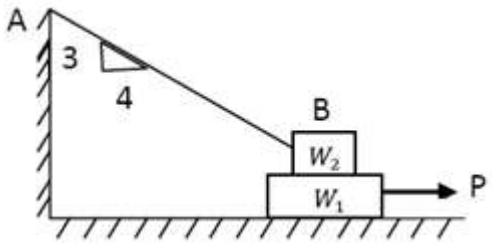
UNIT – II

4. Determine the forces in all the members of the frame shown in figure below. Indicate the nature of the forces also. 12M



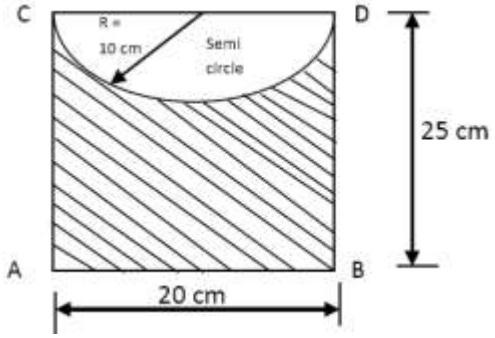
OR

5. A block of weight W_1 is 1290N rests on a horizontal surface and supports another block of weight W_2 is 570 N on top of it as shown in figure below. Block of weight W_2 is attached to a vertical wall by an inclined string AB. Find force 'P' applied to the lower block, that will be necessary to cause the slipping to impend. Coefficient of friction between blocks (1) and (2) is 0.25 and coefficient of friction between (1) and horizontal surface is 0.40. 12M



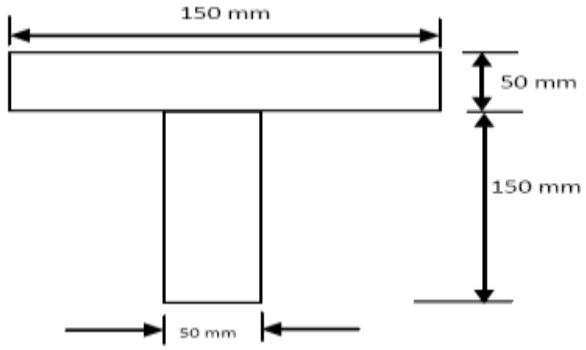
UNIT-III

6. Find the moment of inertia of the shaded area shown in figure given below, about the edge AB. 12M



OR

7. a) Locate the centroid of T-section as shown in the figure given below. 6 M



b) Determine of moment of inertia of rectangular section about the x-x axis and about the y-y axis passing through the C.G. 6 M

UNIT – IV

8. a) A stone dropped into a well is heard to strike the water after 4 seconds. Find the depth of the well. Assume velocity of sound as 350 m/s. 6 M

b) A car starts from rest on a curved road of 250 m radius and accelerates at a constant tangential acceleration of 0.6 m/sec^2. Determine the distance and time for which that car travel before the magnitude of total acceleration attained by it becomes 0.75 m/sec^2. 6 M

OR

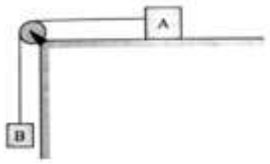
9. a) A body moves along a straight line and its acceleration ‘a’ which varies with time ‘t’ is given by a =6-4t. Five seconds after the start of observation, the velocity is 18 m/s. The

distance moved by the body 8 sec after the start of observation of motion from origin is 75 m. Determine the acceleration, velocity and distance from the origin at the start of observation. 6 M

b) The speed of a flywheel changes from 10 rad/s to 30 rad/s in 5 seconds. Determine the angular acceleration of the wheel and number of revolutions made in 5 seconds. 6 M

UNIT – V

10. a) Two blocks A and B are connected with an inextensible but flexible string, as shown in figure. Let the system be released from rest. Determine the velocity of the block A after it has moved a distance of 0.7m. Assume that the coefficient of friction between block A and the plane is 0.31. The masses of the blocks are m_A=95kg and m_B=143kg. Pulley is frictionless. 6 M



b) A bullet of 25 gm mass is fired with a speed of 400 m/s. What is its kinetic energy? If the bullet can penetrate 20 cm in a block of wood, what is the average resistance of the wood? If the bullet were fired into a similar block of 10 cm thick wood, what would be the exit speed? 6 M

OR

11. a) State and explain the principle of conservation of energy. 6 M

b) Three blocks *A*, *B* and *C* are connected as shown in the Figure. Find acceleration of the masses and the tension T_1 and T_2 in the strings. Given μ_1=0.2 and μ_2=0.25. Pulley is frictionless. 6 M