Code No: 152AH

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester (Special) Examinations, January - 2021
ENGINEERING MECHANICS
(Common to CE, ME, MCT)

Time: 2hrs   Max.Marks:75

Answer any five questions
All questions carry equal marks
- - -

1.a) Prove varignon's principle of moments.
 b) Differentiate between:
    i) Concurrent and non-concurrent forces
    ii) Coplanar and non-coplanar forces
    iii) Moment of force and couple.   [7+8]

2. Three cylinders weighing 100 N each and of 80 mm diameter are placed in a channel of 180 mm width as shown below figure 1. Determine the reactions exerted by a) the cylinder A on B at the point of contact and b) the cylinder B on the base and on the wall.   [7+8]
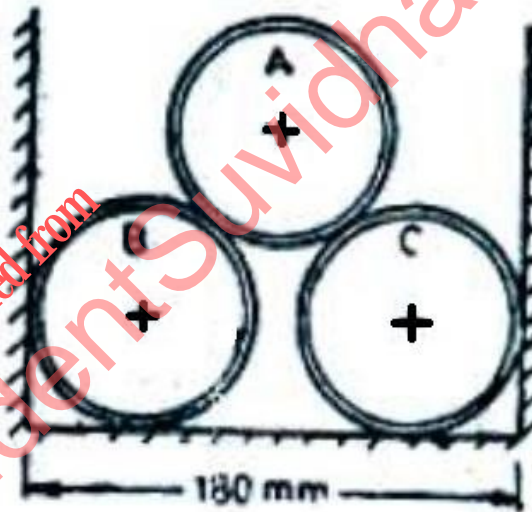
Figure: 1

3. The efficiency of a screw jack will be maximum for raising a load W, if $\alpha = -45^0 - \varphi/2$. Derive an expression for the above condition and prove that the maximum efficiency is given by: $\eta_{max} = 1\text{-}\sin \varphi/1\text{+}\sin\varphi$.   [15]

4.a) Define the terms moment of inertia and radius of gyration.
 b) Prove that the moment of area of any plane figure about a line passing through its centroid is zero.   [7+8]

5. Derive an equation for mass moment of inertia of circular plate of radius 'R' and thickness 't' about its diameter.   [15]

6.a) A car accelerates uniformly from a speed of 30 Km/Hr to a speed of 75 Km/Hr in 5 secs. Determine the acceleration of the car and the distance traveled by the car during 5 secs.
 b) State the law of conservation of momentum.   [10+5]

7. Two blocks of weight 150 N and 50 N are connected by a string and passing over a frictionless pulley as shown in figure 2. Predict the acceleration of blocks A and B and the tension in the string. [15]
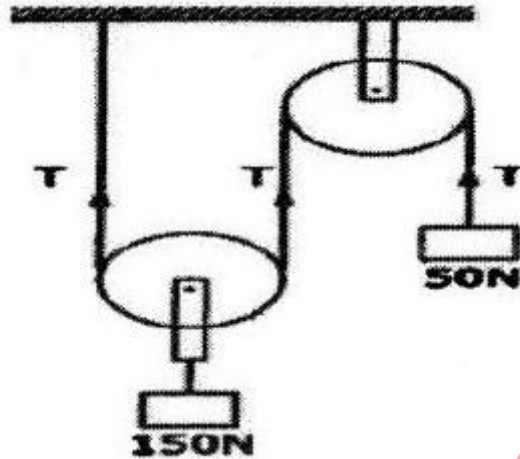

Figure: 2

8. Two weights 800 N and 200 N are connected by a thread and they move along a rough horizontal plane under the action of a force of 400N applied to the 800 N weight as shown in figure 3. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Using Alembert's principle, determine the acceleration of the weight and tension in the Thread. [15]
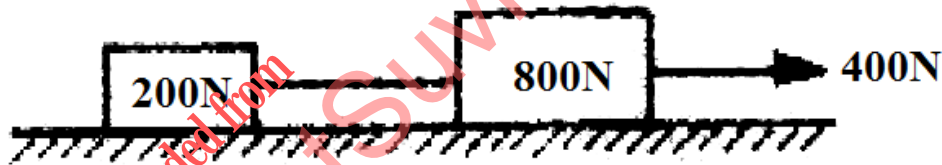

Figure: 3

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