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Code No.: 21603 S

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. II Year I-Semester (Supplementary) Examinations, May/June-2016

Bridge Course : Engineering Mechanics-I

Time: 3 hours

Max. Marks: 50

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (15 Marks)

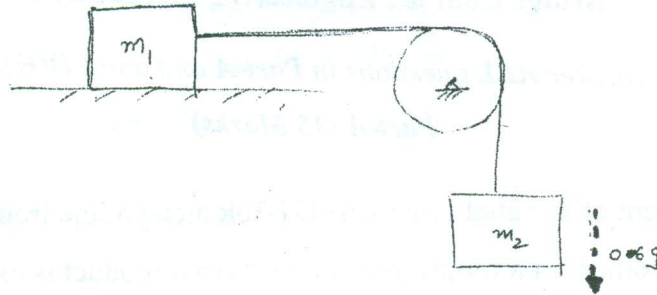
1. Find the component of a spatial force $10i+12j-30k$ along a line from A(2,0,4) to B(3,4,2). [1]
2. For finding the moment of a force along a line is cross product is used. (True / False) [1]
3. A stone is thrown vertically upward and returns to earth in 5 sec. How high does it go? If air resistance is ignored. [1]
4. Write the kinematic equations for rectilinear motion. [1]
5. Mention the laws of friction. [1]
6. A block of weight 100N rests on a rough horizontal surface with coefficient of friction 0.15. Determine the maximum friction force developed at motion in impending condition. [2]
7. Explain wedge friction. [2]
8. Define the term 'mass moment of inertia' by providing suitable examples. [2]
9. Write the governing equations for curvilinear motion in kinetics. [2]
10. Distinguish between plane motion and rotation. [2]

Part-B (5 X 7=35 Marks)

11. a) If $\mathbf{a} = 2i+7j+4k$ and $\mathbf{b} = -i+3k$, find the values of $\mathbf{a} \cdot \mathbf{b}$ and $\mathbf{b} \times \mathbf{a}$. [3]
b) In a spatial coordinate system, various points are referenced as given : A (8,0,0), B(4,-5,0), C(0,-10,0), D(0,0,-3) and E(0,3,6). A force F passes through B to E with a force multiplier of $F_m = 10 \text{ N/m}$. Find the moment of F about (i) the point A and (ii) a line passing through AD. [4]
12. a) Define cone of friction. [3]
b) Determine the minimum and maximum horizontal force P required for the block which is placed on inclined ground of 30° has a weight 100kN. The angle of friction at all contact surfaces is 15° . [4]
13. a) A ball is thrown vertically into the air at 35 m/s. After 3 sec, another ball is thrown vertically. With what initial velocity must the second ball have, so that it passes the first ball 30 m from the ground? [3]
b) A stone is dropped so that it strikes the inclined ground at $s = 70\text{m}$. If the ball rises to a maximum height of $h=17.5\text{m}$ above the point of release, compute its initial velocity V_0 and inclination with ground. [4]

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14. a) Define the term Statics and Dynamics. [3]
 b) In the system of connected bodies shown, the pulleys are of negligible weight and frictionless. Determine the mass m_1 if mass m_2 (50kN) has an downward acceleration of $0.6g$. [4]



15. a) Define the term pure rotation for kinematics. [3]
 b) Show that the body has plane motion means, the displacement of instantaneous center is zero. [4]
16. a) Given the vectors $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j} - 4\mathbf{k}$, $\mathbf{b} = 4\mathbf{i} + 2\mathbf{j} + \mathbf{k}$ and $\mathbf{c} = 3\mathbf{i} - \mathbf{j} - 2\mathbf{k}$, evaluate component of $(\mathbf{a} \times \mathbf{b})$ along $(\mathbf{a} \times \mathbf{c})$. [3]
 b) A 500 N block rests on an inclined of 45° having coefficient of static friction as 0.25. Compute the value of horizontal force P necessary to just start the block. [4]
17. Write short notes on any *two* of the following: [7]
 a) Instantaneous center (IC) in plane motion.
 b) Resultant force and inertial force with respect to dynamics, in rectilinear motion.
 c) Distinguish between kinematics and kinetics.

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