

FACULTY OF ENGINEERING & INFORMATICS

B.E. I Year (Common to all branches) Examination, May/June 2012

ENGINEERING MECHANICS

Time : 3 Hours]

[Max. Marks : 75

Answer **all** questions from Part-A.
Answer any **five** questions from Part-B.

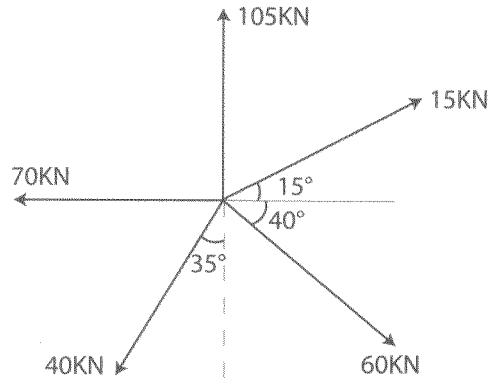
Part A — (Marks : 25)

1. State the law of transmissibility 2
2. What is a free body diagram? 2
3. Differentiate centroid and centre of gravity? 2
4. Define various laws of friction? 3
5. State parallel axis theorem. 3
6. Differentiate rectilinear motion and curvilinear motion? 3
7. State D' Alemberts principle 3
8. A block of weight 35N is placed on a smooth inclined plane which makes 45° with horizontal. Calculate the work done when the block is pulled by 5m? 3
9. Differentiate direct impact and oblique impact? 2
10. What is co-efficient of restitution? 2

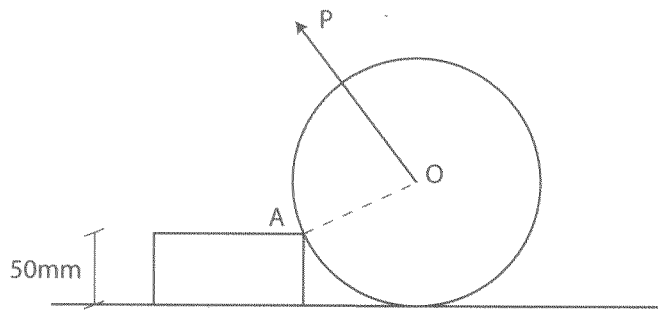
[P.T.O.]

Part B — (Marks: 50)

11. (a) Determine the resultant of the concurrent forces shown in the figure. 5

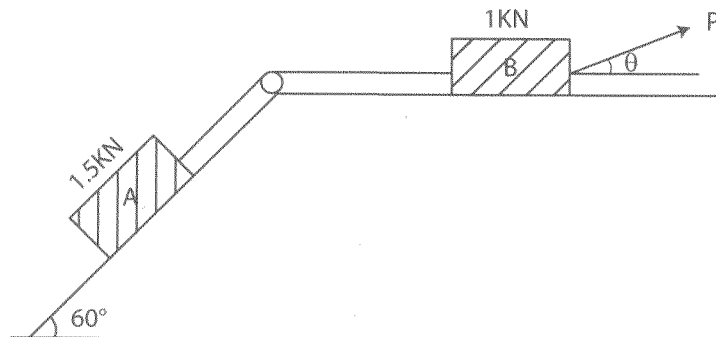


- (b) Find the least value of force P required to overcome an obstacle 50mm high to a roller weighing 10kN and 100mm radius. Also find the reaction at the block? 5



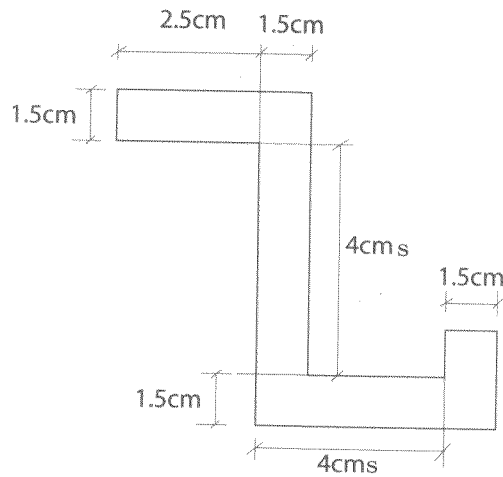
12. Determine the centroid of the surface of a right circular cone of attitude h ? 10

13. Determine the least value of the force P to cause motion to impend rightwards. Assume the co-efficient of friction under the blocks to be 0.2 and the pulley to be frictionless. 10



14. Find the M.I. of the section shown below about centroidal axis xx perpendicular to the web.

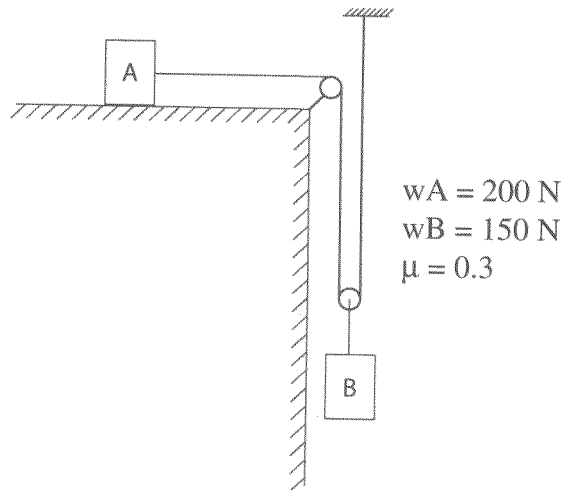
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15. (a) Motion of a particle is given by $x = t^3 - 3t^2 - 9t + 12$. Determine time position and acceleration of the particle when its velocity becomes zero? 4

- (b) A bullet of mass 90g and moving with a velocity of 310 m/sec is fired into a log of wood and it penetrates to a depth of 10cm. If the bullet moving with the same velocity were fired into a similar piece of wood 6 cm thick, with what velocity would it merge. Find also the force of resistance assuming it to be uniform?

16. Find the velocities of blocks, if block B shown in fig. falls vertically at a distance of 2m. 10



17. If m_1 and m_2 are the masses of two bodies u_1, u_2 and v_1, v_2 are the velocities of the bodies before and after impact. Show that the loss of kinetic energy due to central

impact is $\frac{m_1 m_2}{2(m_1 + m_2)} [(u_1 - u_2)^2 (1 - e^2)]$.

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