

FACULTY OF ENGINEERING

B.E. (Bridge Course) II-Semester (Supplementary) Examination, January 2013

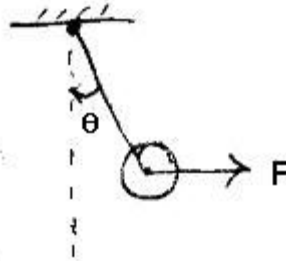
Subject : Engineering Mechanics

Time : 3 Hours

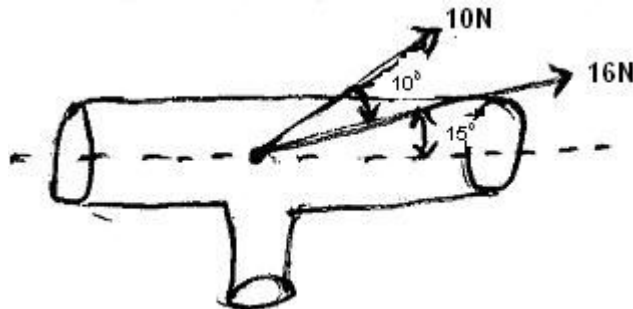
Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part-B.**PART – A (25 Marks)**

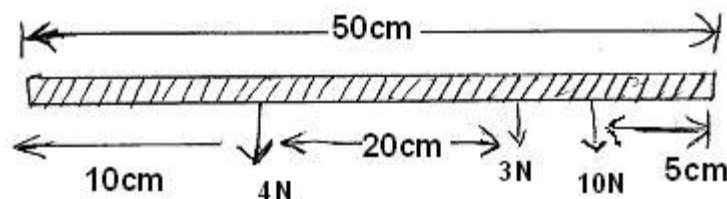
1. A sphere of weight 80N is attached to a string as shown below. Determine the angle the string makes with the vertical and also the tension in the string if $F=200$ KN. (3)



2. Find the resultant of the two forces shown below: (2)



3. Define moment of inertia and polar moment of inertia? (2)
 4. Write about any four laws of friction. (2)
 5. Determine the centre of gravity of the following system. (2)

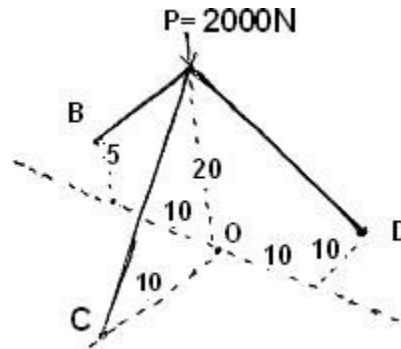


6. State the theorem of perpendicular axis. How will you prove this theorem? (3)
 7. A body is moving with a velocity of 11 m/s. After 5 seconds the velocity of the body becomes 15 m/s. Find the acceleration of the body. (2)
 8. A wheel, rotating about a fixed axis of 22 rpm, is uniformly accelerated for 60 seconds, during which time, it takes 50 revolution. Determine initial angular velocity and angular displacement. (3)
 9. A body of mass 20N is moving with a velocity of 75 m/sec. What will be the kinetic energy of the body? (3)
 10. A hammer of mass 500 kg drops from a height of 1m on a pile of mass 100kg. Determine the common velocity after impact ? Assume the impact between the hammer and pile to be plastic. (3)

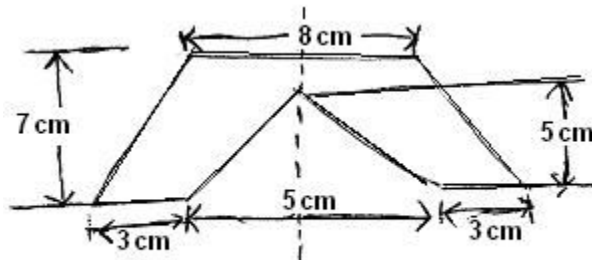
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PART – B (50 Marks)

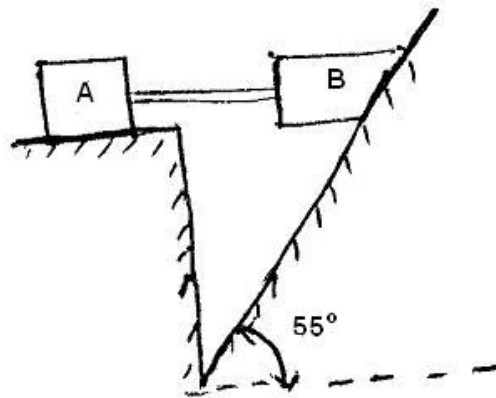
11. A vertical load of 2000 N is supported by the three members as shown below. Find the force in each member. Point C, O and D are in XZ plane, while, B is 5m above this plane. (10)



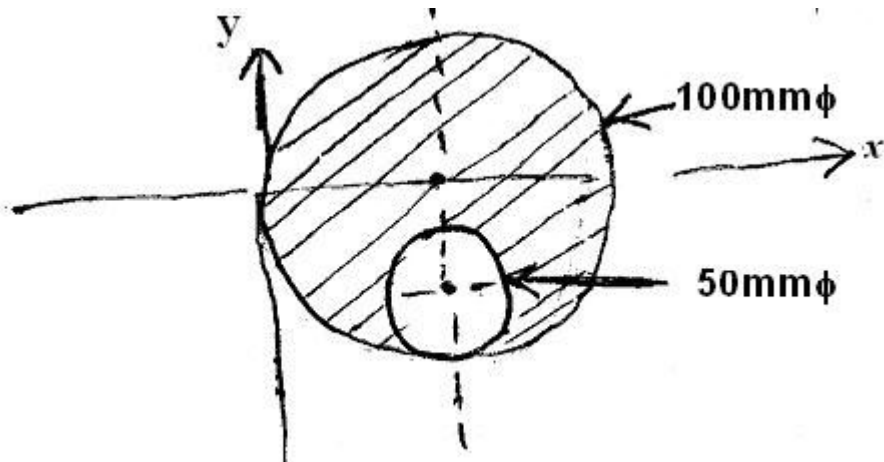
12. With the cross-section of a given object shape, compute the moment of inertia about the horizontal axis A-A. (10)



13. Two blocks A and B are connected by a horizontal rod and are supported on two rough planes as shown below. If the weight of Block B is 1000 N and co-efficient of friction of Block A and B are 0.21 and 0.32 respectively. Find the smallest weight of block A for which equilibrium can exist. (10)



14. From a circular plate of diameter 100mm a circular part of diameter 50mm is cut as shown below. Find the centroid of the remainder. (10)



..3..

15. On a straight road, a thief's car passes a police station with a uniform velocity of 12m/sec. After 9 seconds, the police jeep follows with a uniform acceleration of 1m/sec^2 . Find the time necessary for the jeep to catch up with the thief's car. (10)
- 16.(a) A fly wheel starts rotating from rest and is given an acceleration of 1 rad / sec^2 . Find the angular velocity and speed in rpm after 2 minutes.
(b) If the fly wheel is brought to rest with a uniform angular retardation of 0.8 rad/sec^2 , determine the time taken by the fly wheel in seconds to come to rest? (10)
17. A tangential force of 2700 N is acting on a shaft of diameter 20mm. Find the work done by the force for one revolution of shaft? Determine the power of the shaft when the shaft is rotating at 400 rpm. (10)
