

Mid-West University
Examinations Management Office
End Semester Examinations 2081

Bachelor level/ B.E. Computer/ 1st Semester

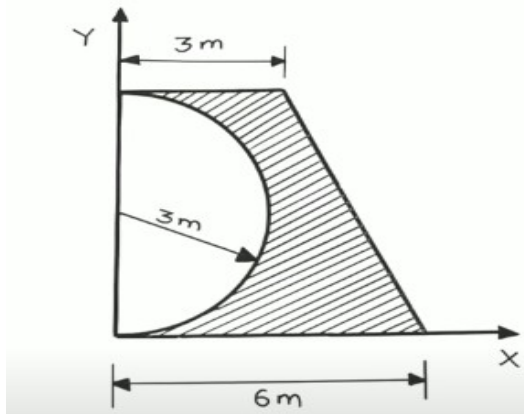
Time: 3 hours

Subject: Applied Mechanics I (CE411/CE501)

Full Marks: 50

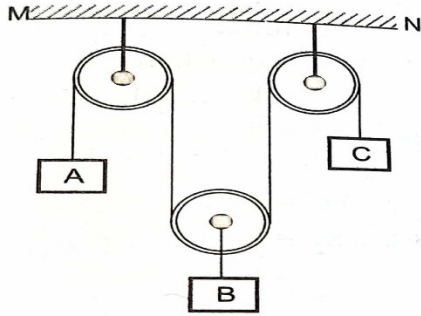
Pass Marks: 25

- Attempt all the questions
 - Figures in the margin indicate full marks.
 - Assume suitable values, with a stipulation, if necessary.
 - Candidates are required to answer the questions in their own words as far as possible.
1.
 - a. What do you mean by rigid body? Why is it necessary to assume a body as "perfectly rigid" for a study of statistics? [1+2]
 - b. State the principle of transmissibility. [2]
 2. The following forces act at a point
 - a. 20 N inclined at 30° towards North of East.
 - b. 25 N towards North.
 - c. 30 N towards North West and
 - d. 35 N inclined at 40° towards South of West.Find the magnitude and direction of the resultant force. [5]
 3.
 - a. State and prove parallel axis theorem for moment of inertia. [4]
 - b. Find the centroid of shaded region of following figure with respect to given x and y reference axes. [5]



4.
 - a. Define the angle of friction. Also state the law of friction. [1+2]
 - b. A body of weight 100N rests on a horizontal surface ($\mu = 0.3$) and is acted upon by a force applied at an angle of 30° to the horizontal. What force is required to just cause the body to slide over the surface? Also, determine the inclination and magnitude of minimum force required to set the block into impending motion. [5]
5. Define the term kinematics How the motion of a particle is found when the acceleration is given function of time. [1+5]
6.
 - a. Define the term kinetics. What do you mean by impulse momentum principle? [1+4]

- b. For a pulley system as shown in figure, calculate the velocity and acceleration of the block C. If the velocity and acceleration of the blocks A and B are 3m/s (\downarrow), 2m/s^2 (\uparrow), 4m/s (\uparrow) and 5m/s^2 (\downarrow) respectively. [5]



7. a. Differentiate between rectilinear and curvilinear motion with examples. [2]
b. The acceleration of a particle is given by the relation $a=21-12X^2$, where a is expressed in m/s^2 and X is in meters. The particle starts with no initial velocity at origin. Determine: [5]
i. The velocity when $X=1.5\text{m}$
ii. The position when velocity is again zero.
iii. The position where the velocity is maximum.

The End