

KATHMANDU UNIVERSITY
End Semester Examination
July/August 2024

Level : B.E.
Year : II
Time : 2 hrs. 30mins.

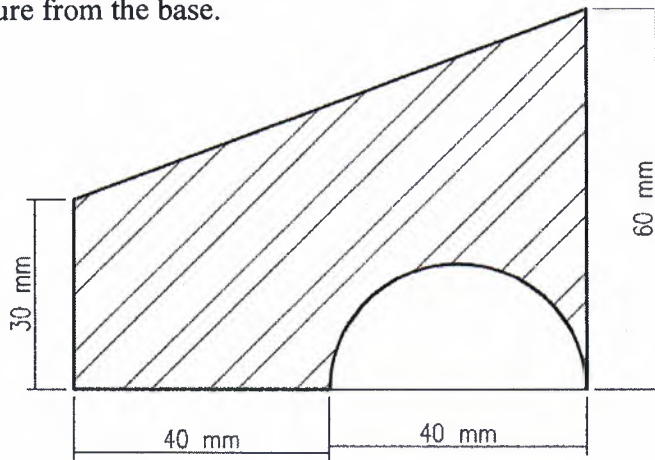
11 AUG 2024

Course : CIEG 203
Semester : I
F. M. : 40

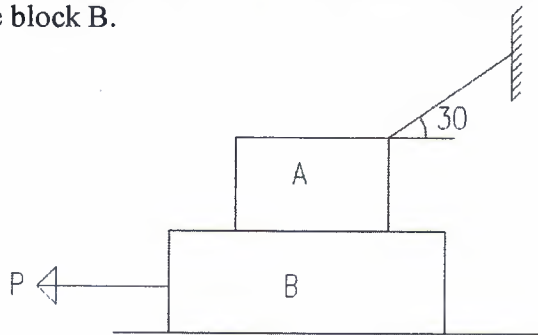
SECTION "B"
[40 marks]

Attempt ALL questions.

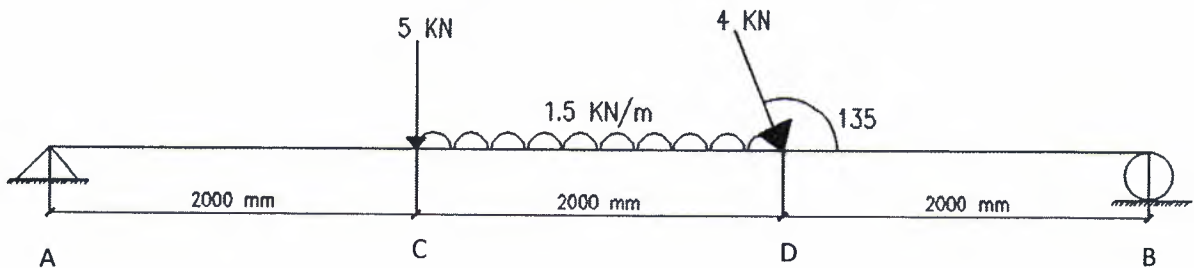
1. Define centroid for a plane figure with required derivation. Calculate the centroid of the given figure from the base. [3+4=7]



2. State the laws of static friction. Two blocks A and B of weights 1 kN and 2 kN respectively are in equilibrium position as shown in Figure. If the coefficient of friction between the two blocks as well as the block B and the floor is 0.3, find the force (P) required to move the block B. [2+5=7]



3. Draw the SFD and BMD for the given beam AB with 6m span length. [8]



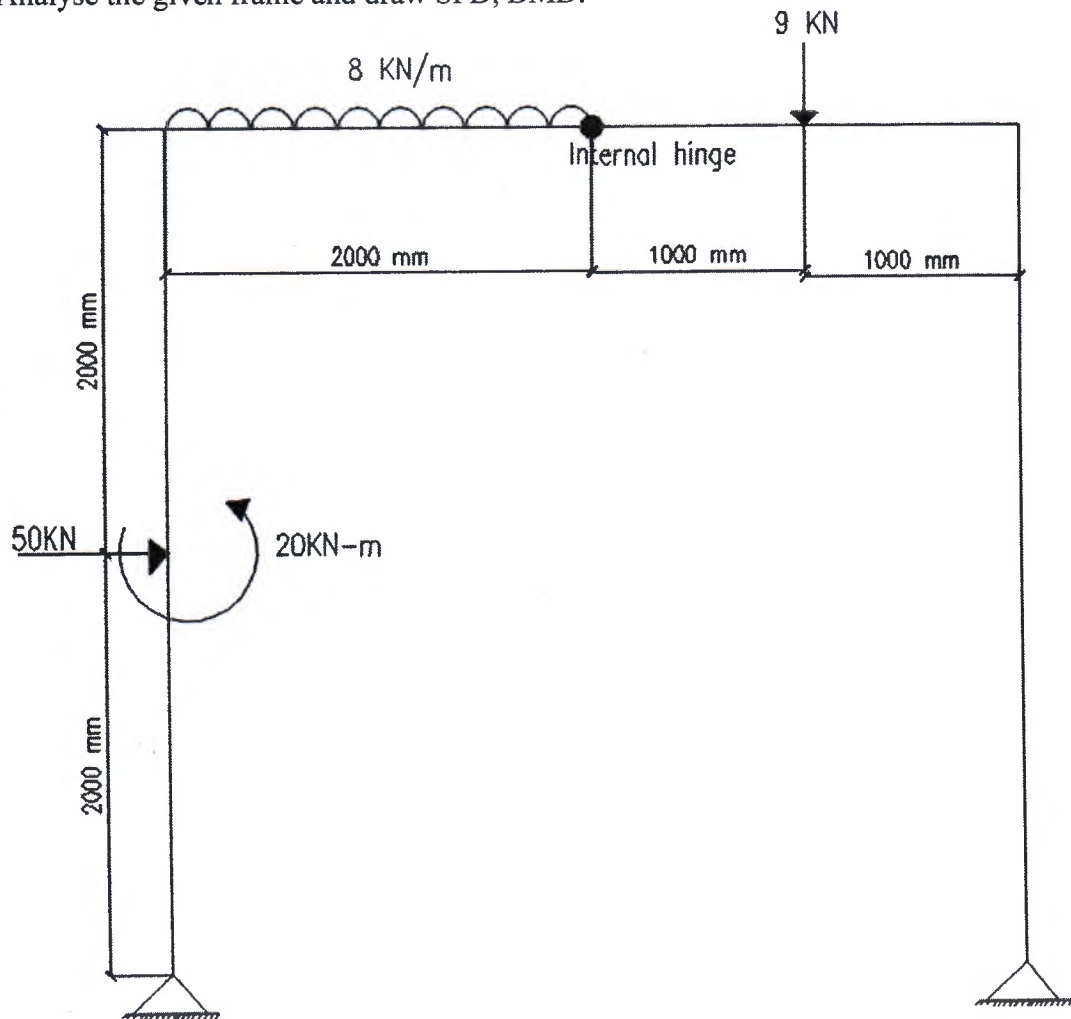
P.T.O.

4. The equation for angular displacement of a particle, moving in a circular path (radius 200 m) is given by :

$$\theta = 18t + 3t^2 - 2t^3$$

where θ is the angular displacement at the end of t sec. Find (i) angular velocity and acceleration at start, (ii) time when the particle reaches its maximum angular velocity; and (iii) maximum angular velocity of the particle. [4]

5. Analyse the given frame and draw SFD, BMD. [8]



6. Define rectilinear and curvilinear motion with examples and sketches. Derive the expression for instantaneous center of two rigid links in combined motion, by the step-wise process of constructing the diagram. [2+4=6]

KATHMANDU UNIVERSITY
End Semester Examination
July/August 2024

Marks Scored:

Level : B.E.

Year : II

Exam Roll No. :

Time: 30 mins.

Course : CIEG 203

Semester : I

F. M. : 10

Registration No.:

Date : 11 AUG 2024

SECTION "A"

[20Q. \times 0.5 = 10 marks]

Choose and encircle the most appropriate option from each set of choices.

1. A framed structure is perfect, if the number of members are _____ ($2j - 3$), where j is the number of joints.
a. less than b. equal to c. greater than d. less than or equal to
2. The relationship $s = ut + \frac{1}{2}at^2$ at is applicable to bodies
a. moving with any type of motion b. moving with uniform velocity
c. moving with uniform acceleration d. both (b) and (c)
3. The motion under gravity is a particular case of motion under _____ ?
a. Constant time b. Constant Velocity c. Constant distance d. Constant mass
4. If two bodies A and B are projected upwards such that the velocity of A is double the velocity of B, then the height to which the body A will rise will be _____ the height to which the body B will rise
a. two times b. four times c. eight times d. six times
5. We are given an equation of displacement (s) in terms of time (t). If we differentiate it with respect to t , the equation so obtained will give
a. Velocity b. acceleration c. distance traversed d. speed
6. The second differentiation, of the above equation will give
a. velocity b. Acceleration c. distance traversed d. Inertial force
7. In case of SHM the formula for time period is:
a. $2\pi/\omega$ b. $\omega/2\pi$ c. $2\pi^2/\omega$ d. $\omega^2/2\pi$
8. We are given an equation of acceleration (a) in terms of time (t). The second integration of the equation will give the
a. velocity b. Distance c. Speed d. Displacement
9. Which of the following statement is wrong?
a. A body falling freely under the force of gravity is an example of motion under variable acceleration.
b. A bus going down the valley may have variable acceleration.
c. A lift going down in a gold mine cannot have constant acceleration in the entire journey.
d. In a cricket match, the ball does not move with constant acceleration

10. The units of torque, work and energy are
 a. Same
 b. Different
 c. Depends conditionally
 d. is equal to the unit of power
11. Which of the following statement is **CORRECT**?
 a. The moment of inertia of a thin circular ring of mass (M) and mean radius (r) is " $0.25 mr^2$ ".
 b. The flywheel is a wheel which is used in flying machines.
 c. The units of kinetic energy of rotation and kinetic energy of translation are different.
 d. The moment of inertia of a thin circular ring of mass (M) and mean radius (r) is " mr^2 ".
12. The torque acting on a body of moment of inertia (I) and angular acceleration α is
 a. $I\alpha$
 b. $I\alpha^2$
 c. $0.5 I\alpha$
 d. $0.5 I\alpha^2$
13. If the net force acting on an object doubles, its acceleration is
 a. Halved
 b. Remains the same
 c. Tripled
 d. Doubled
14. In order to increase the acceleration of a mass rolling down on a rough inclined plane (without slipping), we have to
 a. Increase the mass of the rolling body
 b. Increase the inclination of the plane
 c. Decrease the friction
 d. Add the pushing force
15. The maximum frictional force that comes in play when a body just begins to slide over the surface of another body is called
 a. Limiting friction
 b. Dynamic friction
 c. Static friction
 d. Kinetic friction
16. Which of the following is the basic law for mechanics?
 a. Newton's law of viscosity
 b. Parallelogram law
 c. Newton's laws of motion
 d. Hooke's law
17. What is the relationship between each force, if three concurrent forces acting on a body according to Lami's theorem?
 a. Directly proportional to the sine of the angle between the other two forces
 b. Inversely proportional to the cosine of the angle between the other two forces
 c. Directly proportional to the cosine of the angle between the other two forces
 d. Inversely proportional to the sine of the angle between the other two force
18. The unit of inertia of mass,
 a. kg/m
 b. kg/m^2
 c. $kg\cdot m^2$
 d. m^3
19. The moment of inertia of a thin spherical shell is
 a. $Mr^4/2$
 b. Mr^2
 c. $2/3 Mr^2$
 d. $2/5 Mr^2$
20. Time of flight of a projectile on a horizontal, plane is
 a. $2u \sin \alpha / g$
 b. $2u \cos \alpha / g$
 c. $2u \tan \alpha / g$
 d. $2u \cot \alpha / g$