21 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2067 Ashadh

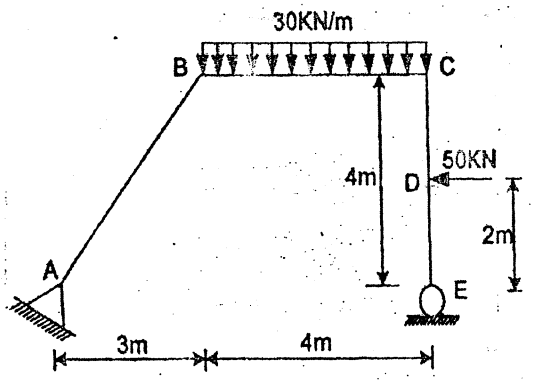
Exam.	Regular/Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BCT, BIE, B.Agri., B.Arch.	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

Subject: - Applied Mechanics

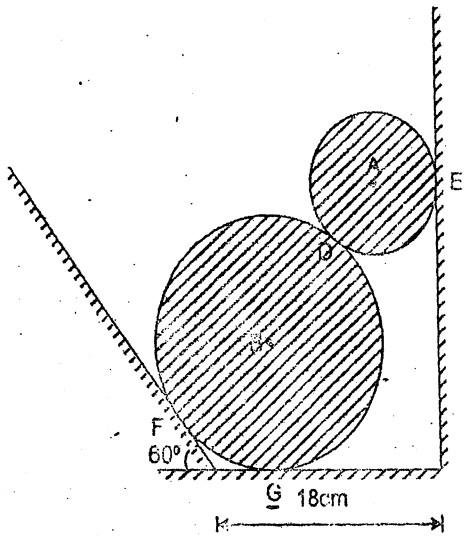
- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt any **Five** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. a) Define rigid and deformable body. Explain principles of free body diagram and static equilibrium while solving problems in statics? Support your answer with examples. [4]

   b) Draw bending moment, shear force and axial force diagrams for the given figure. And also give ordinates of the salient points, if any. [12]

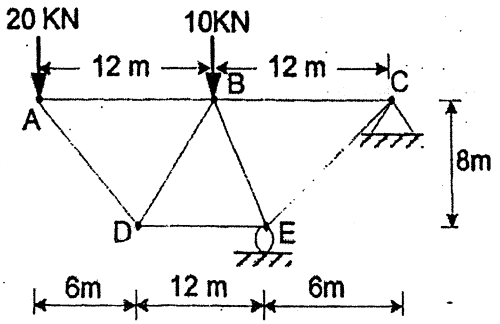


2. a) Two cylinders A and B rest in a channel as shown in figure below. 'A' has a diameter of 10cm and weight 20kg. 'B' has 18cm diameter and weight 50kg. The channel is 18cm wide at the bottom with one side vertical and other side at 120° as shown. Determine the reactions at four contact points. [11]



b) State and prove the parallel axis theorem for moment of inertia. [5]

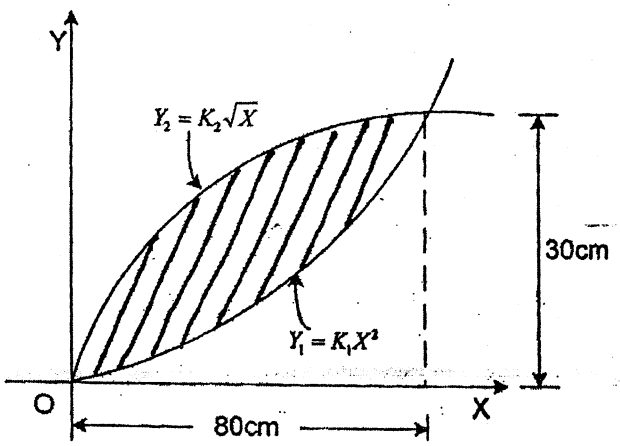
3. a) Calculate the member forces of the given truss shown in figure below. [10]



b) Define discrete and continuum structure. Also discuss about stability, indeterminacy, and determinacy of structures with suitable examples. [6]

4. a) Define limiting friction and impending motion. Justify why coefficient of static friction is greater than coefficient of kinetic friction. [5]

b) Determine the moment of inertia and radius of gyration of the common area as shown in figure below about x and y axis. [11]



5. a) The acceleration of a particle is directly proportional to the time (t). At time (t) = 0, the velocity of the particle is v = 16 m/sec. Knowing that velocity (v) = 15 m/sec position (x) = 20m and time (t) = 1 sec, determine the velocity, the position and total distance travelled when time (t) = 7 sec. [8]

b) A particle is projected at an angle of 30° to horizontal axis with an initial velocity of 61m/sec hit the target located at 'h' meter below the horizontal axis and having the inclined slope of ¾ downward from the axis of the target. Find the sloping distance covered by the projectile and the maximum height achieved by particle from the target. [8]

6. a) Define angular momentum and also prove that rate of change of angular momentum is equal to the moment of the force acting on that particle about the same point. [6]

b) The motion of a particle is defined by the position vector (r) = $3t^2i + 4t^3j + 5t^4k$ where r is in meter and t is in second. Find the normal and tangential component of acceleration and the principal radius of curvature at the instant when t = 4 secs. [10]

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