Roll No. _____   [Total No. of Pages : 4

2E2005

B.Tech. I Year II Semester (Main) Examination-2013

205 Engineering Mechanics

ৠ Hours   **Maximum Marks : 80**

                                               Min. Passing Marks : 24

ṁctions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

UNIT - I

1. a) State and prove parallelogram of forces.   **(6)**

   b) Find the magnitude of two forces such that if they act at right angles, their resultant is $\sqrt{10}$ kN and when they act at an angle of 60°, their resultant is $\sqrt{13}$ kN.   **(10)**

OR

1. a) By the principle of virtual work, find the values of reactions at A and B. **(6)**
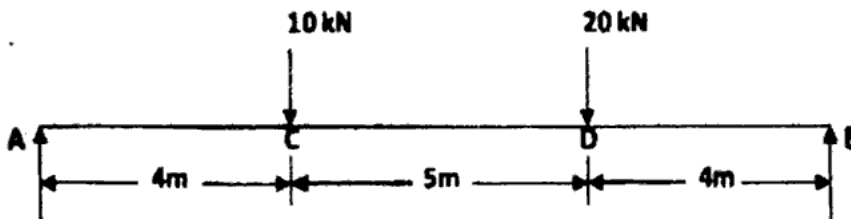
   b) The following forces act at a point: **(10)**

      i)   20 N inclined at 30° towards North of East.

      ii) 25N towards North.

iii)   30 N towards north west

iv)   35 N inclined at 45° towards south of west.

Find the magnitude and direction of the resultant force

UNIT - II

2. a)   Draw neat sketch of first system of pulleys and obtain expression of mechanical advantage, velocity ratio and efficiency.   **(6)**

    b)   What force is required to raise the load W shown in figure? Assume efficiency of the system to be 85%.   **(10)**


W=12000 N   rtuonline.com
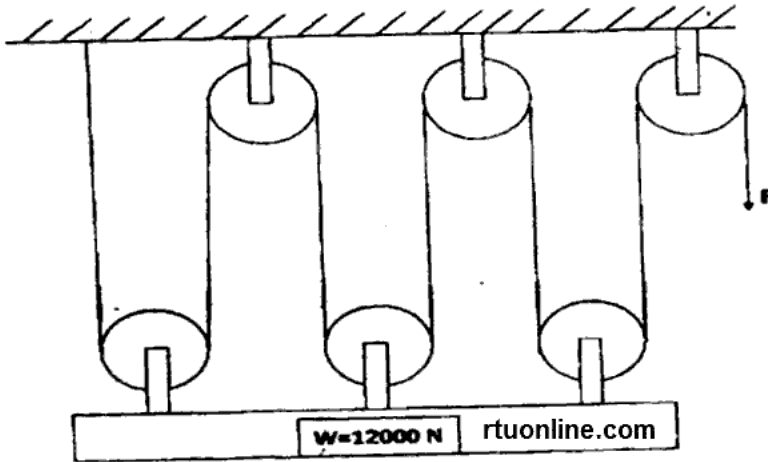
OR

2.   Find the moment of inertia of the following fig. about XX and YY axis.   **(16)**

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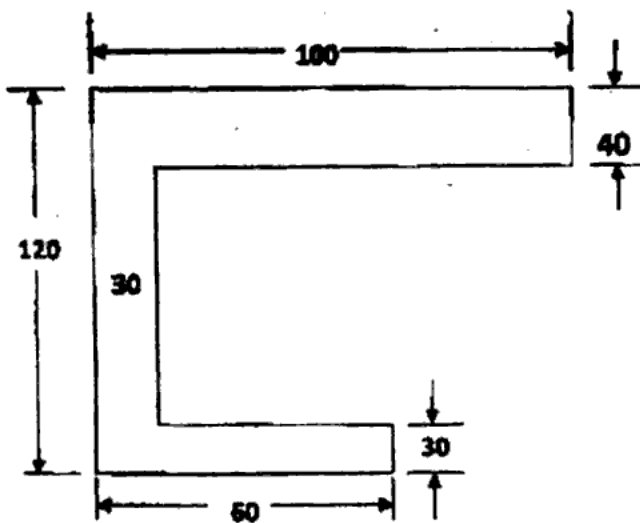
UNIT - III

shown in fig. is 6m long and is supported by a horizontal floor
The coefficient of friction between the floor and the ladder is
ween wall and ladder is 0.4. The weight of the ladder is 200 N and
CG. The ladder also supports a vertical load of 900 N at C which
distance of 1m from B. Determine the least value of α at which the
der may be placed without slipping.   (10)
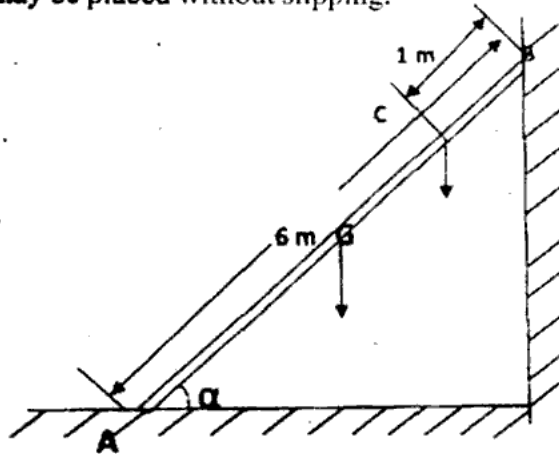
b) Explain different types of friction. State different laws of static and dynamic friction   (6)

OR

a) Derive the expression for belt length for open belt drive.   (6)

b) In an open belt drive the sum of the diameters of two pulleys is 60 cm. They are running at 1500 and 3000 rpm. Determine the diameter of each pulley assuming the total slip of the system is 5%. The pulley running at 1500 rpm is the driver pulley.   (10)

UNIT - IV

4. a) Derive an expression for the maximum height and range of a projectile traversed by a stone thrown with an initial velocity of u and an inclination of θ.

b) A projectile fired from the edge of a 150m high cliff with an initial velocity of 180 m/s at an angle of elevation of 30° with the horizontal. Neglecting air resistance find:

i) The greatest elevation above the ground reached by the projectile:

ii) Horizontal distance from the gun to the point, where the projectile strikes the ground. **(10)**

OR

4. a) In an accident of car which was moving on a straight level road, it had skidded in 50 meters after the brakes were applied. Find the speed of the car just at the time of applying the brake. The coefficient of friction between tyre and road is 0.5. **(6)**

   b) A stone is allowed to fall from the top of the tower 100 meters in height and at the same time another stone thrown vertically upwards with a velocity of 25 m/s. Find where and when they will meet? **(10)**

5. a) What do you understand ...... energy? Explain various forms of mechanical energies. **(6)**

   b) A 40 ton rail car travel ...... les with a 100 ton wagon on the same track, moving in ...... 1.2 km/h. Find their velocities immediately after imp ...... energy. What is the impulse between them? **(10)**

5. a) A body weighing 600 ...... ne plane. The plane is inclined at an angle of 45° with ...... pulled up the plane and the distance of 5m. Calcul ...... the body. **(6)**

   b) A 4 kg stone is dropped ...... es the ground with a velocity of 25 m/s.

   i) Find the kinetic energy of the stone as it strikes the ground and the height h from which it was dropped.

   ii) From what height must a 1 kg stone be dropped so it has the same kinetic energy? **(10)**

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