

Government College of Engineering, Aurangabad

(An Autonomous Institute of Government of Maharashtra)

F. E.(ETC,CSE, IT) Examination

End Semester Examination- ~~December~~ 2016

AM1001: Engineering Mechanics

Time: Three hours

Max. Marks: 60

“Verify the course code and check whether you have got the correct question paper.”

N.B.:-

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Assume suitable data if necessary and state it clearly.
4. Use of non-programmable calculator is allowed.

Q1.a) Write any three (6)

- i) State principle of transmissibility of force with explanation.
- ii) State the analytical conditions of equilibrium for non-coplanar force system.
- iii) If equivalent force couple system at C.G. of the rigid body consist of resultant force R with resultant couple $C=0$. Predict the state of motion and how will be the paths of its particles.
- iv) Define coefficient of restitution and its value for different types of impacts.
- v) What do you understand by dynamic equilibrium?

b) Write any two: (6)

- i). Derive the relation between work and energy for angular motion.
- ii) State laws of dry friction.
- iii) Two spheres of equal masses having velocities 25 m/s and 10 m/s collide centrally and then move together. Determine the velocities of both the masses after collision.
- iv) State and prove parallel axis theorem.

Q2. Attempt any two: (12)

- a) Obtain the resultant of the force system acting on plate (Fig.1) at point A. Predict the state of motion and find the equilibrant to bring the system in equilibrium.
- b) Determine the reactions at hinge support A and roller support B of the structure shown in Fig.2.
- c) Determine the support reactions and forces at hinge B of the frame shown in Fig. 3.

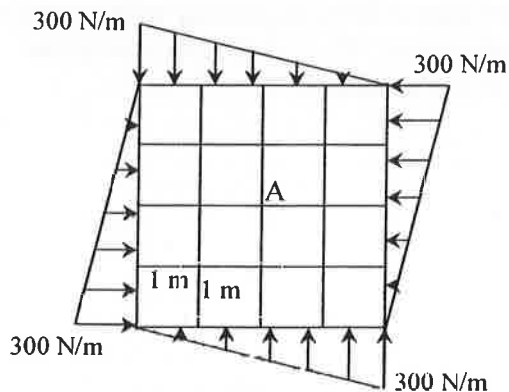


Fig.1 (Q2.a)

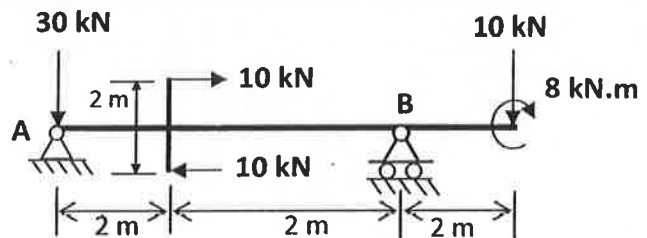


Fig.2(Q2.b)

Q3. a) Solve any one : (4)

- i) Derive formula for the centroid of triangle.
- ii) Determine the force P required to just start the block A up the incline (Fig. 4).
- b) Determine the M.I. of I-section about centroidal X-Y axes (Fig.5).

(8)

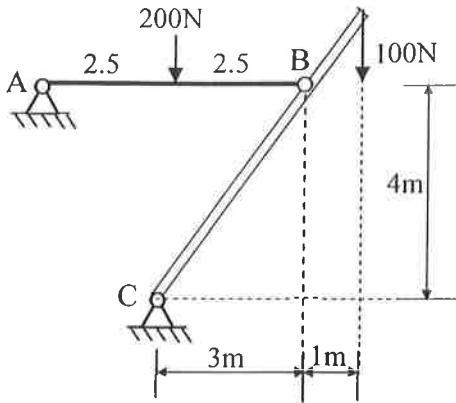


Fig.3(Q2.c)

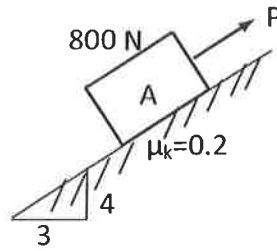


Fig. 4 (Q3.b)

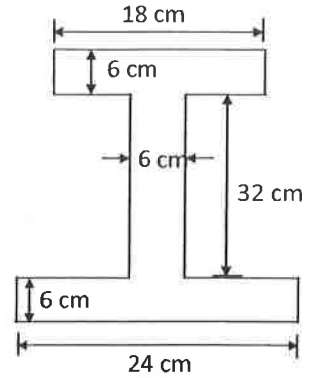


Fig. 5 (Q3.b)

Q4. Attempt any two:

(12)

a) The acceleration of a particle is $a = -4\text{m/s}^2$. At time $t=0$ sec, $s=0$ m and $v=+24\text{m/sec}$. Find the velocity, displacement, and total distance travelled when $t=8$ seconds.

b) The basketball player likes to release the ball at an angle of 60° to the horizontal and from a height of 2.1m from ground surface. What initial speed v_0 will cause the ball to pass through the center of the rim at the height of 3m from ground surface and 4m away from point of release?

c) A motorist enters a curve of radius 750 m with speed 100 km/h. He suddenly applies the break causing the vehicle to slow down at a constant rate. The speed of vehicle has been reduced to 75 km/h after 8 sec. Determine the acceleration of the vehicle immediately after the break have been applied.

Q5. Attempt any two:

(12)

a) An elevator of gross weight of 4000 N starts to move upward with a constant acceleration and acquires velocity of 2 m/s after traveling a distance of 4m. Find the pull in the cable during accelerated motion. Calculate the pressure transmitted by the man weighing 700 N to the elevator floor.

b) Two blocks A and B are connected as shown in Fig.6. Determine the velocity of the blocks after block A covers a distance of 2m. Also determine the tensions in the strings and the accelerations of the blocks. The pulleys are frictionless and weightless. The coefficient of kinetic friction is 0.25.

c) Two steel blocks of masses 0.6 kg and 0.9 kg are approaching each other with velocities of 4 m/s and 2 m/s, respectively, immediately before impact. If $e = 0.75$, then determine their velocities after impact and also the energy loss during impact.

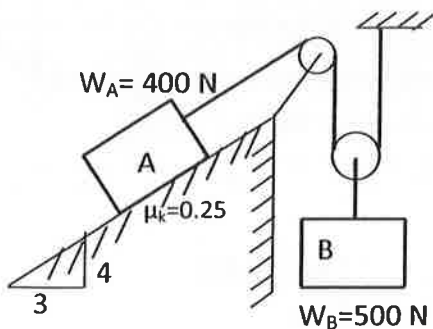


Fig.6 (Q.5b)