St. Francis Institute of Technology (Engg. College)

Internal Assessment Test-II

Academic Year: 2018-2019

Branch: All branches

Subject: Engineering Mechanics

Date: 19/10/2018

Marks: 20 Marks

Year: F.E Semester: I

Time: 10:00am -11:00am

No. of Pages: 02

Instructions:

1. Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.
2. All questions are **compulsory**.
3. Draw neat diagrams wherever necessary.
4. Write everything in ink (no pencil) only.

Q.1. Attempt any five.

a. Draw FBD for different bodies to move the block A up the plane. (Refer Figure 1) **2M**

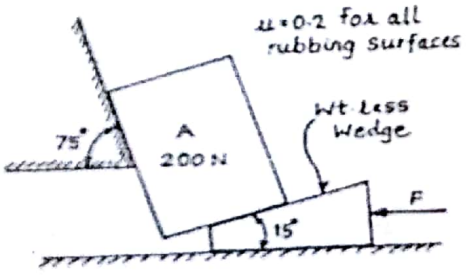

Figure 1

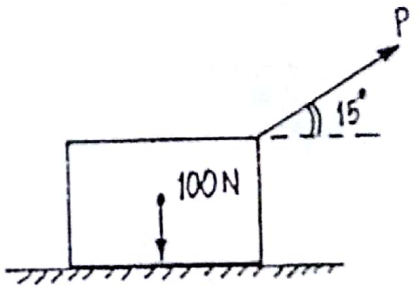

Figure 2

b. A wooden block of Figure 2 rests on a rough horizontal plane. Determine the force P required to start its motion to the right. Take coefficient of friction as 0.4. **2M**

c. The equation of motion of a particle moving in a straight line is given by $S=18t+3t^2-2t^3$ where 'S' is in meter and 't' is in second. Find velocity and acceleration of the particle at t = 3 s. **2M**

d. A ball is thrown from a horizontal level, such that it clears a wall 6 m high, situated at a horizontal distance of 35 m. If the angle of projection is 60° with respect to horizontal, what should be the minimum velocity of projection? **2M**

e. A car is travelling along a circular curve that has a radius of 50m. If its speed is 16m/s and is increasing uniformly at $8m/s^2$. Determine the magnitude of its normal acceleration at this instant. **2M**

f. A uniform ladder AB, 3m long, weighs 200N. The coefficient of friction between the wall and ladder is 0.3 and that between floor and ladder is 0.4. The ladder, in addition **2M**

to its own weight, has to support a person weighing 800N at end A. Draw the FBD of the ladder when it is in impending motion. (Refer to Figure 3)

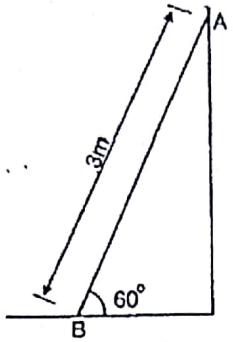

Figure 3

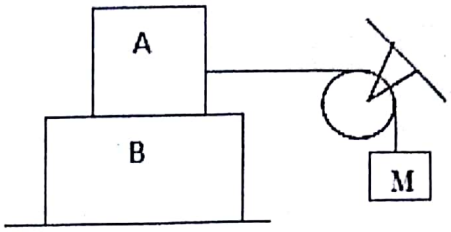

Figure 4

Q.2. Attempt any one.

a. The mass of block A is 23kg and that of B is 36 kg. The coefficient of friction between rough surface and block B is 0.2 and that between block A and block B is 0.4. If the pulley is assumed to be smooth, determine the minimum mass 'm' for motion to be impending. (Refer Figure 4) **5M**

b. It is observed that a skier leaves the platform at A and then hits the ramp at B after 5 second. Calculate the initial velocity 'u' and launch angle 'α'. (Refer Figure 5) **5M**

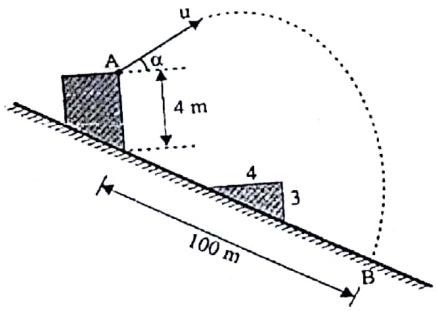

Figure 5

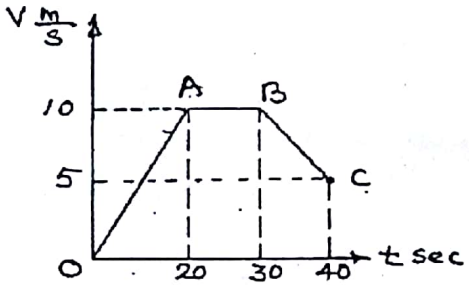

Figure 6

Q.3. Attempt any one.

a. The velocity – time graph for a particle moving along a straight line is shown in Figure 6. Draw Displacement – Time and Acceleration – Time graphs. Find the maximum Displacement of the particle. Show all important values for velocitiy and displancement. **5M**

b. Two cars A and B travelling in the same direction on adjacent lanes are stopped at a traffic signal. As the signal turns green car A accelerates at a constant rate of 2 m/s^2. Three seconds later car B starts and accelerates at 3.6 m/s^2. Find (1) when and where B will overtake A, (2) the speed of each car at that time. **5M**