Total No. of Printed Pages:04

**F.E. (Sem-I) (Revised Course 2019-2020)**
**EXAMINATION NOV/DEC 2019**
**Basics of Mechanical Engineering**

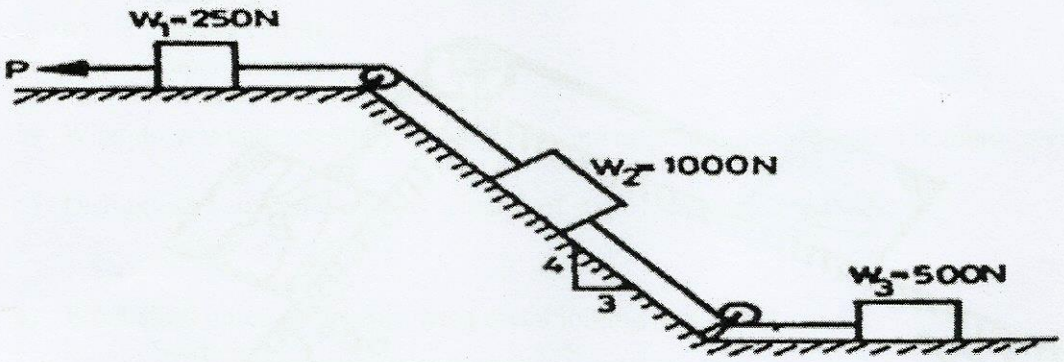
**[Duration : Three Hours]** **[Total Marks :100]**

**Instructions:**
1) Answer **any two** questions each from Part-A and Part-B and **one** question from part-C
2) Assume suitably **any missing** data

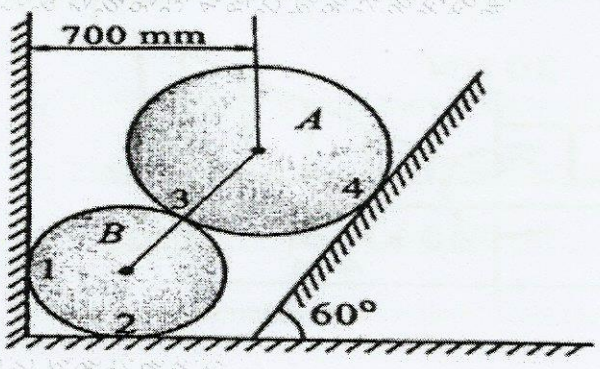
## PART- A

Answer **any two** Questions

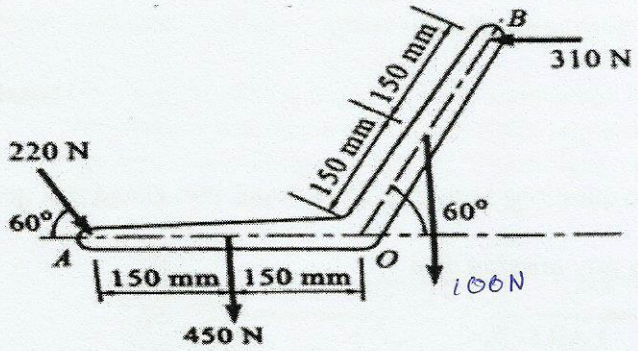
**Q.1** a) Determine the constant force P that will give the system of bodies shown in Fig. a velocity of 3m/sec after moving 4.5m from rest. Coefficient of friction between the blocks and plane is 0.3. pulleys are smooth. Use work energy method. **10**



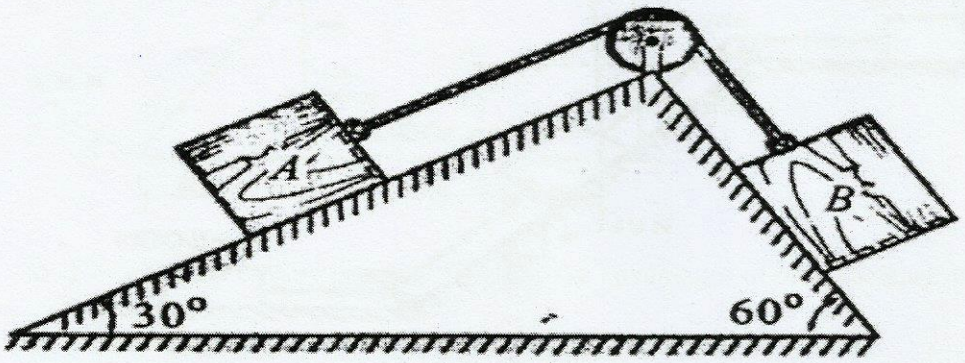

b) Two spheres A and B of weight 1000 N and 750 N, respectively are kept as shown in the Fig below. Determine the reactions at all contact points 1,2, 3 and 4. Radius of A=400 mm and radius of B=300 mm. **10**



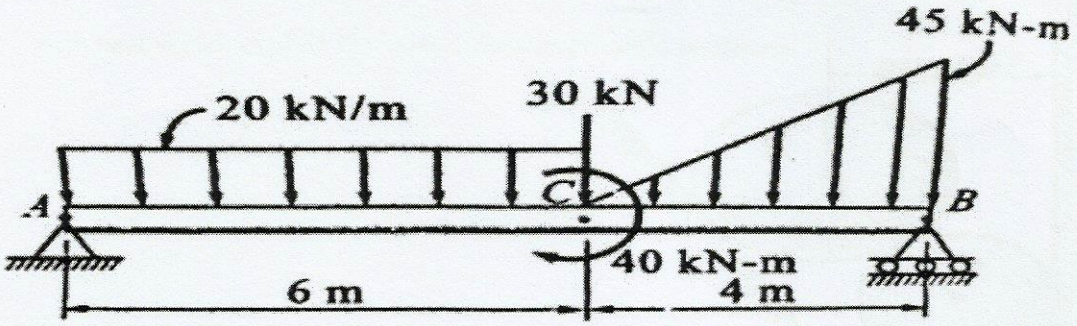
**Q.2** a) Determine the resultant of the forces acting on the bell crank shown in fig below and locate it with respect to point A. **10**



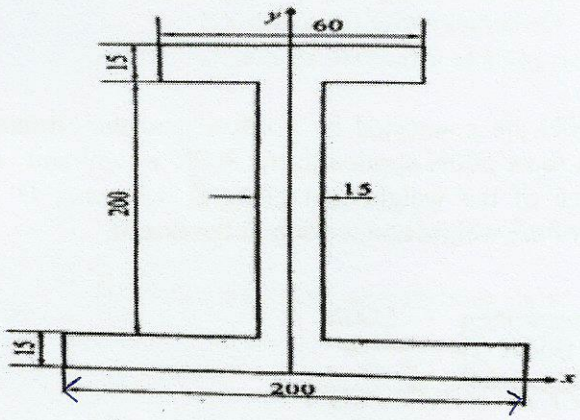

b) Two blocks A and B are placed on inclined planes as shown in Fig. the block A weights 1000N. Determine the minimum weight of the block B for maintaining the equilibrium of the system. Assume that the blocks connected by an inextensible string passes over a frictionless pulley. Coefficient of friction between block A and plane is 0.25 and assume the same between block B and the plane. **10**




**Q.3** a) Calculate the support reactions for the beam shown in fig below. **08**



b) Find the centroid of the unequal I-section shown in Fig. calculate M.I about the centroidal x and y axis. **12**




## PART-B

Answer **any two** questions.

**Q.4**

a) With neat sketches explain the following operations carried out on lathe **10**
   i) Knurling
   ii) Thread cutting
   iii) Taper turning

b) What do you understand by macroscopic and microscopic viewpoints in thermodynamics? **5**

c) Distinguish between the terms 'change of state', 'path', and 'process' **5**

**Q.5**

a) Write short notes on the following metal joining processes: **10**
   i) Soldering
   ii) Brazing

b) What do you understand by point function and path function? **5**

c) Derive the expression for displacement work. **5**

**Q.6**

a) Briefly explain the ,main parts of a lathe machine. **5**

b) Explain the basic components of CNC machine **5**

c) Explain the concept of specific heat and latent heat. **5**

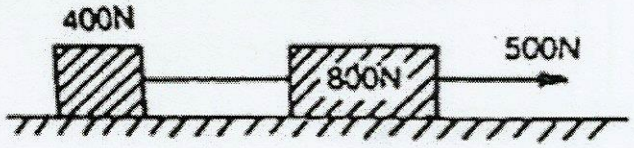
d) What is a thermodynamic system? State the difference between open and closed system. **5**

## PART-C

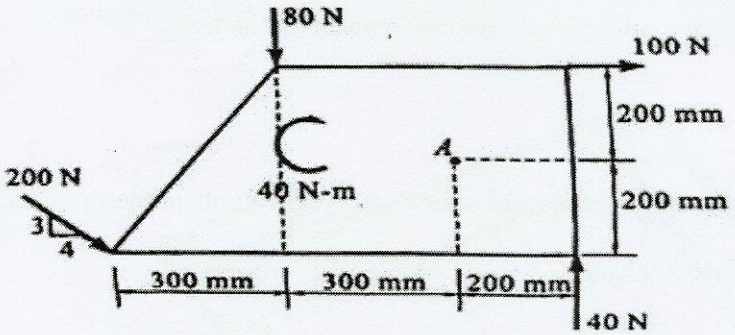
Answer **any one** Question

**Q.7**

a) Two weight 400N and 800N are connected by a thread and they move along a horizontal plane under the action of a force 500N applied to the 800N weight and coefficient of friction between the sliding surface of the weight and plane is 0.3 using D' Alembert principle determine the acceleration of the weight and tension in the thread. **10**




b) Determine the resultant of the force system and locate it with respect to point A **10**




**Q.8**

a) Define metal casting process. What are the advantages of metal casting process. **5**

b) Define forging and explain the various types of forging. **5**

c) Explain thermodynamic equilibrium with appropriate example. **5**

d) With neat sketch explain the various thermodynamic processes. **5**