

07 AUG 2023

Reg. No.

Question Paper Code

12121

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Second Semester

Civil Engineering

(Common to Mechanical Engineering)

20ESCE201 - ENGINEERING MECHANICS

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

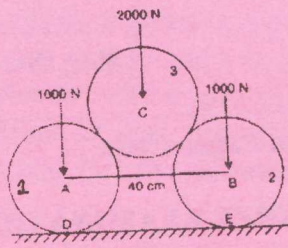
Answer ALL Questions

- |                                                         | Marks,      |
|---------------------------------------------------------|-------------|
| 1. Define the following 1. Static 2. Dynamic.           | K-Level, CO |
| 2. State the Parallelogram law of forces.               | 2,K1,CO1    |
| 3. List the different types of beams with diagram.      | 2,K1,CO1    |
| 4. Mention the equation of equilibrium of a rigid body. | 2,K1,CO2    |
| 5. Define Friction.                                     | 2,K1,CO2    |
| 6. What is co-efficient of Rolling resistance?          | 2,K1,CO3    |
| 7. State Perpendicular axis theorem.                    | 2,K1,CO3    |
| 8. Define Radius of gyration.                           | 2,K1,CO4    |
| 9. Distinguish between kinetics and kinematics.         | 2,K1,CO4    |
| 10. State law of conservation of momentum.              | 2,K2,CO5    |
|                                                         | 2,K1,CO5    |

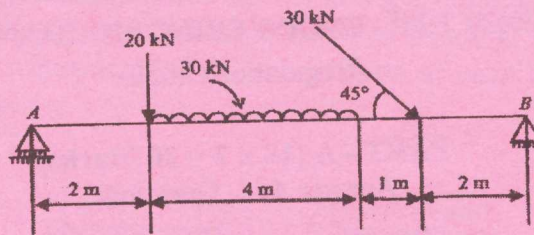
PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

- 11 a) The following forces act a point (i) 200 N inclined at 30° towards the North of East. (ii) 250 N towards North (iii) 300 N towards North West (iv) 350 N inclined at 40° towards South of West. Find the resultant of the force system. 13,K3,CO1
- OR
- b) Two smooth circular cylinders each of weight 1000 N and radius 15 cm are connected at their centers by a string AB of length 40 cm and rest upon a horizontal plane, supporting above them a third cylinder of weight 2000 N and radius 15 cm as shown in Figure. Predict the force S in the string AB and reactions on the floor at the points of contact D and E. 13,K3,CO1

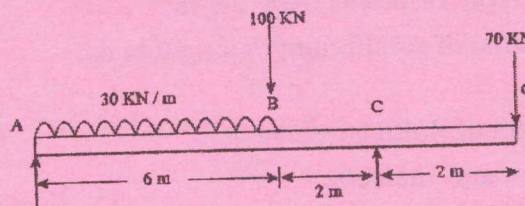


12. a) Find the reactions at the supports A and B of the simply supported beam shown in the figure. 13, K3, CO2

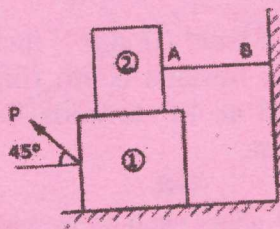


OR

- b) One side overhanging beam is loaded as shown in fig. Determine support reactions. 13, K3, CO2

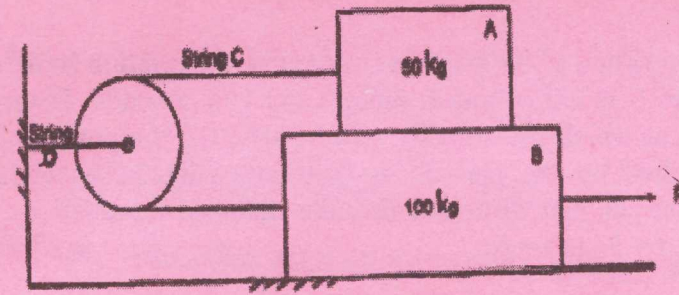


13. a) Block (2) rests on block (1) and is attached by a horizontal rope AB to the wall as shown in fig. What force P is necessary to cause motion of block (1) to impend? The coefficient of friction between the blocks is 0.25 and between the floor and block (1) is 0.3. Mass of blocks (1) and (2) are 20 kg and 10 kg respectively. 13, K3, CO3

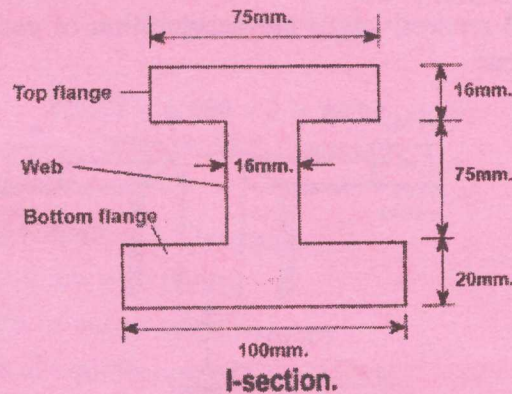


OR

- b) Two blocks A and B of mass 50 kg and 100 kg respectively are connected by a string C which passes through a frictionless pulley connected with the fixed wall by another string D as shown in figure. Find the force P required to pull the lock B. Also find the tension in the string D. Take coefficient of friction at all contact surfaces as 0.3. 13, K3, CO3

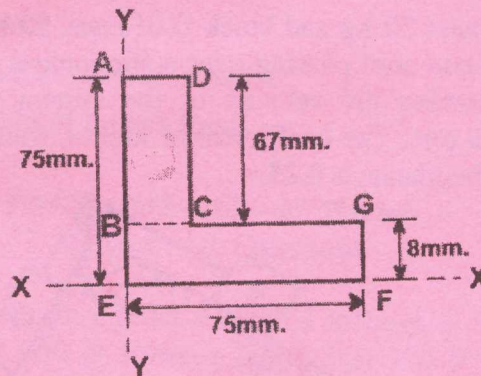


14. a) Determine Centroid, Moment of Inertia  $I_{xx}$ ,  $I_{yy}$  about XX and YY axis for an I section shown in fig. 13,K3,CO4



OR

- b) Determine Centroid, Moment of Inertia  $I_{xx}$ ,  $I_{yy}$  about XX and YY axis for a L section as shown in fig. 13,K3,CO4



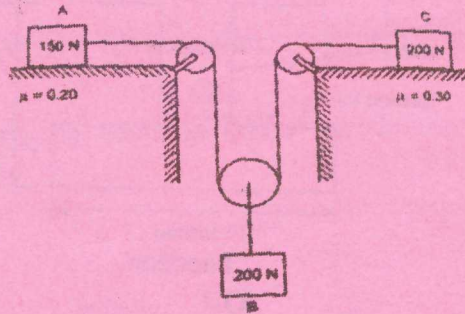
15. a) A train is traveling from A to D along the track shown in fig. Its initial velocity at A is zero. The train takes 6 min to cover the distance AB, 2300 m length and 3 minutes to cover, the distance BC, 3250 m in length, on reaching the station C, the brakes are applied and the train stops 2300 m beyond, at D (i) Find the retardation on CD, (ii) the time it takes the train to get from A to D, and (iii) its average speed for the whole distance. 13,K3,CO5

OR

- b) The position of the particle is given by the relation  $S=6t^3-8t^2-20t+40$ , where  $S$  is expressed in meters and  $t$  in seconds. Determine (i) the time at which the velocity will be zero (ii) the position and distance travelled by the particle at that time (iii) the acceleration of the particle at that time and (iv) the distance travelled by the particle from  $t = 3s$  to  $t = 6s$ . 13,K3,CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Three blocks are arranged as shown in Fig Coefficient of friction between Blocks A and floor and between Block C and floor are **0.2** and **0.3** respectively. Find acceleration of each block. Pulleys are weightless. 15,K3,CO6



OR

- b) Block P of mass **30 kg** and block Q of mass **50 kg** are connected by a weightless cord passing over a frictionless pulley as shown in Fig Determine the velocity of the system 3 seconds after starting from rest. The coefficient of kinetic friction between the blocks and the planes is **0.25**. 15,K3,CO6

