

# CBCS Scheme

USN

--	--	--	--	--	--	--	--	--	--

17CIV13

## First Semester B.E. Degree Examination, Dec.2017/Jan.2018 Elements of Civil Engineering & Mechanics

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer *FIVE* full questions, choosing one full question from each module.

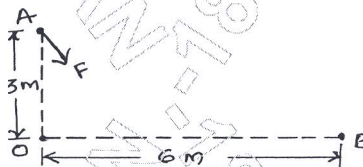
### Module-1

- 1 a. Briefly give the scope of different fields in Civil Engineering. (10 Marks)
- b. List and briefly explain the types of force systems with example. (10 Marks)

OR

- 2 a. Write the classification of roads and comparison of flexible and rigid pavements. (10 Marks)
- b. The moment of certain force 'F' is 180 kN-m clockwise about 'O' and 90kN-m counter clockwise about 'B'. If its moment about 'A' is zero, determine the force 'F'. Refer fig.Q2(b). (10 Marks)

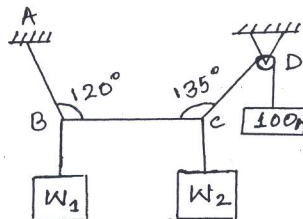
Fig.Q2(b)



### Module-2

- 3 a. State and prove Parallelogram law of forces and also write the significance of the law. (10 Marks)
- b. In the fig. Q3(b) the portion BC of the string is horizontal and pulley is frictionless. Determine tensions in different segments of the string. Also find W1 and W2. Use Lami's theorem. (10 Marks)

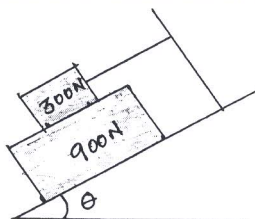
Fig.Q3(b)



OR

- 4 a. Define the terms : i) Angle of friction   ii) Cone of friction. (04 Marks)
- b. What should be the value of  $\theta$  if fig. Q4(b) which will make the motion of 900N block down the plane to impend? The coefficient of friction for all contact surfaces is  $1/3$ . (06 Marks)

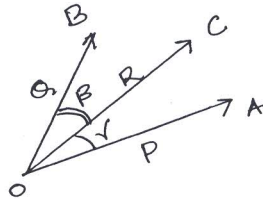
Fig.Q4(b)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- c. Two forces P & Q are acting at point 'O' as shown in fig. Q4(c). the resultant force is 400N, angles  $\beta$  and  $\gamma$  are  $35^\circ$  and  $25^\circ$  respectively. Find the two forces P and Q. (10 Marks)

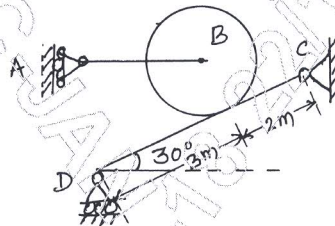
Fig.Q4(c)



**Module-3**

- 5 a. Explain i) Types of loads ii) Types of support. (10 Marks)  
 b. A roller weighing 2000N rests on an inclined bar, which is 5m long and weighing 800N as shown in fig. Q5(b). Determine the reactions developed at supports C and D. (10 Marks)

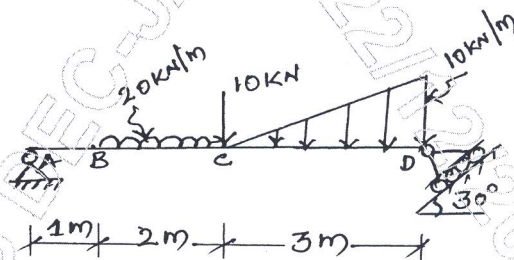
Fig.Q5(b)



OR

- 6 a. State and prove 'Principle of Moments' (10 Marks)  
 b. Determine the reactions at the supports for the beam loaded as shown in fig. Q6(b). (10 Marks)

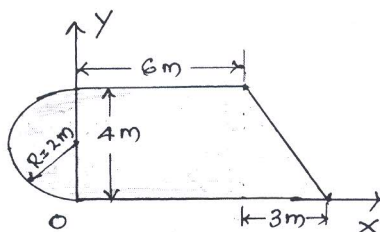
Fig.Q6(b)



**Module-4**

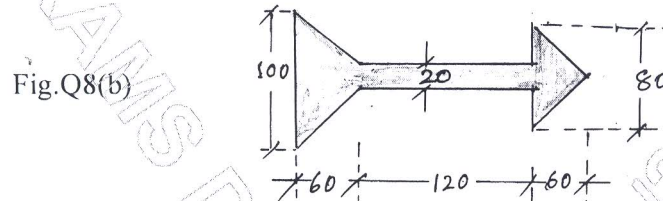
- 7 a. Determine the centroid of a right angle triangle of base 'b' and height 'h' from first principle. (08 Marks)  
 b. Determine the centroid of the area shown in fig. Q7(b) with respect to the axes shown. (12 Marks)

Fig.Q7(b)



OR

- 8 a. Determine the moment of Inertia of a circle about its diametral axis by the method of integration. (06 Marks)
- b. Determine the moment of inertia of the section shown in fig. Q8(b) about the Vertical Centroidal axis. All dimensions are in mm. (14 Marks)

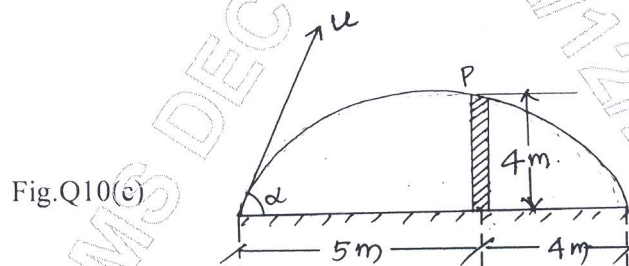


**Module-5**

- 9 a. State and explain Newton's laws of motion. (10 Marks)
- b. On a straight road, a smuggler's car passes a police station with uniform velocity of 10m/sec. After 10 secs, a police van follows in pursuit with a uniform acceleration of 1m/sec<sup>2</sup>. Find the time necessary for the police van to catch up with the smuggler's car. (10 Marks)

OR

- 10 a. What is Projectile? Define the terms i) Angle of projection ii) Horizontal range. (06 Marks)
- b. Define : i) Centrifugal force ii) Super elevation. (04 Marks)
- c. Find the least initial velocity with which a projectile is to be projected so that it clears a wall of 4m height located at a distance of 5m, and strikes the ground at a distance 4m beyond the wall as shown in fig. Q10(c). The point of projection is at the same level as the foot of the wall. (10 Marks)



\* \* \* \* \*