

# CBCS SCHEME

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15CIV13/23

## First/Second Semester B.E. Degree Examination, Aug./Sept.2020 Elements of Civil Engineering and Engineering Mechanics

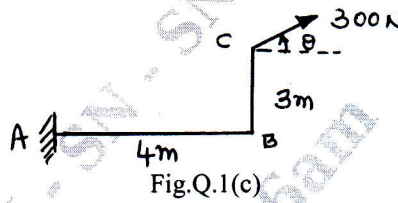
Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Assume missing data suitably.*

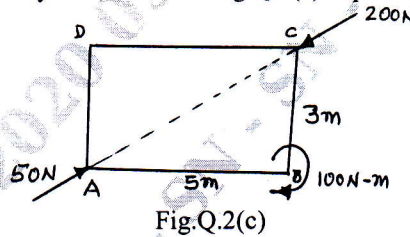
### Module-1

- 1 a. State the effect of the infrastructural development on socio economic of the country. (05 Marks)
- b. What is dam? Explain different types of dams with examples. (05 Marks)
- c. Determine the angle  $\theta$  for the force shown in Fig.Q.1(c) to produce maximum moment about A and minimum moment about A. Also determine maximum and minimum moments. (06 Marks)



OR

- 2 a. State and explain different types of classification of roads. (06 Marks)
- b. State and explain principle of transmissibility principle of physical independence and principle of super position. (06 Marks)
- c. Find equivalent force for the system shown in Fig.Q.2(c) at point A. (04 Marks)



### Module-2

- 3 a. State and prove Parallelogram law of forces. (05 Marks)
- b. State the laws of friction. (03 Marks)
- c.

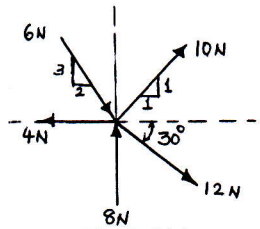


Fig.Q.3(c)

Find resultant force for the system shown in Fig.Q.3(c).

(08 Marks)

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 e.g. 42+8 = 50, will be treated as malpractice.

OR

- 4 a. State and explain Lami's theorem. (04 Marks)  
 b. Find the reactions at contact points for the sphere shown in Fig.Q.4(b). (04 Marks)



Fig.Q.4(b)

- c. A block of weight 200N is placed on rough inclined plane with an angle of  $30^\circ$  with respect to horizontal as shown in Fig.Q.4(c). Find the force P required to impend motion up plane and also find force P to prevent sliding down. If coefficient of friction is 0.3 for contact surfaces. (08 Marks)

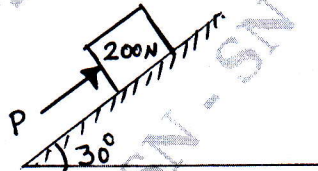


Fig.Q.4(c)

**Module-3**

- 5 a. State and prove Varignon's theorem. (04 Marks)  
 b. State and explain different types of supports. (04 Marks)  
 c. Find Resultant force with respect to 'A' for the system of forces shown in Fig.Q.5(c). (08 Marks)

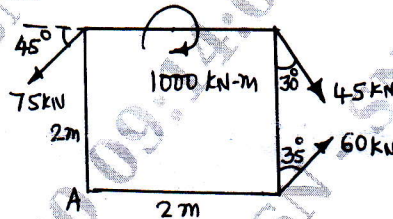


Fig.Q.5(c)

OR

- 6 a. Distinguish between resultant and equilibrant. (03 Marks)  
 b. Find resultant force for the system shown in Fig.Q.6(b). (03 Marks)

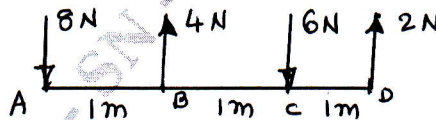


Fig.Q.6(b)

- c. Find reactions at supports of the beam shown in Fig.Q.6(c) (10 Marks)

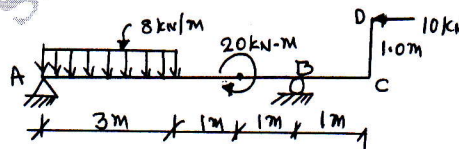


Fig.Q.6(c)

**Module-4**

- 7 a. Distinguish between centroid and center of gravity. (02 Marks)  
 b. Determine moment of inertia of triangle of base B and height 'h' about centroidal axis parallel to base. (06 Marks)  
 c. Determine the centroid of the lamina shown in Fig.Q.7(c). (08 Marks)

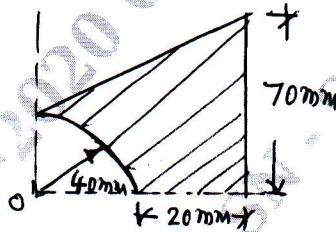


Fig.Q.7(c)

OR

- 8 a. Determine the centroid of quarter circle of radius 'R' about diametrical axes. (06 Marks)  
 b. State parallel axis theorem. (02 Marks)  
 c. Find radius of gyration for the lamina shown in Fig.Q.8(c) about horizontal centroidal axis. (08 Marks)

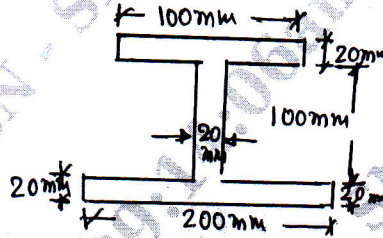


Fig.Q.8(c)

**Module-5**

- 9 a. Derive the equations of linear motion. (06 Marks)  
 b. A car moving with a velocity of 15m/sec. The car is brought to rest by applying brakes in 5 seconds. Determine retardation and distance travelled by car after applying brakes. (04 Marks)  
 c. A particle projected in air with a velocity 100m/sec and at angle of  $30^\circ$  with horizontal. Find maximum height, range and time of flight. (06 Marks)

OR

- 10 a. Define displacement, velocity and acceleration. (03 Marks)  
 b. A stone dropped into well is heard to strike the water after 4 seconds. Find the depth of well if the velocity of sound is 350m/sec. (05 Marks)  
 c. A projectile is fired from the edge of a 150m high cliff with an initial velocity of 180m/sec at an angle of  $30^\circ$  with horizontal find horizontal distance from the gun to the point where the projectile strikes the ground and greatest height the projectile reached. (08 Marks)

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