

**STESC103 / STBSC103 - Engineering Mechanics**

P. Pages : 3

Time : Three Hours

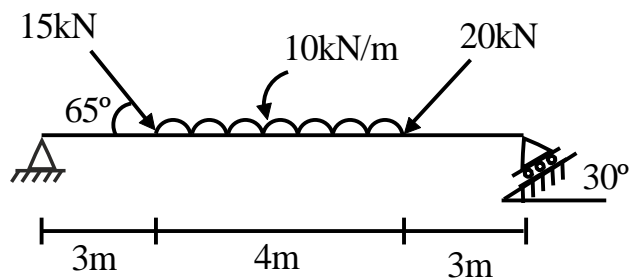


**GUG/W/24/16148**

Max. Marks : 80

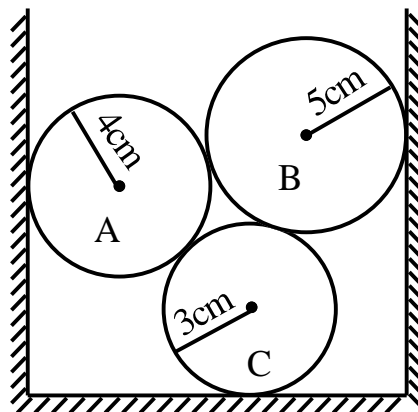
- Notes :
1. All questions carry equal marks.
  2. Due credit will be given to neatness and adequate dimensions.
  3. Assume suitable data wherever necessary.
  4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) State types of forces with help of suitable example. 8  
 b) For the beam shown in figure determine reaction at support. 8



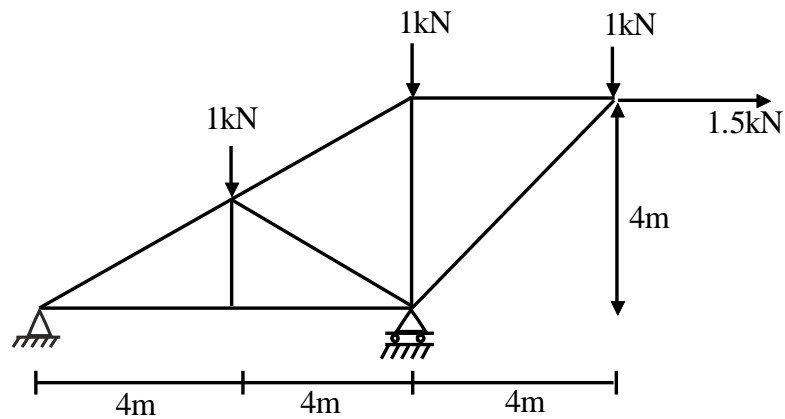
**OR**

2. a) Three cylinder are piled in a rectangular ditch as shown in figure. Neglecting friction, determine the reaction between cylinder A and wall. 8



- b) Write down types of support with the help of neat sketches. 4
- c) State and explain Lami's theorem. 4

3. a) Determine the forces in member of truss shown in figure. 12



- b) State the laws of dry friction. 4

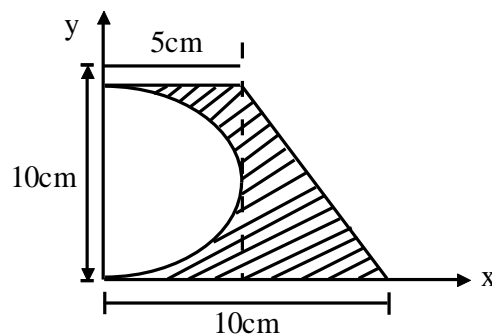
**OR**

4. a) What are assumption made in analysis of truss. 6

- b) Write short note on limiting friction. 4

- c) Derive  $\frac{T_2}{T_1} = e^{4B}$  for coil friction. 6

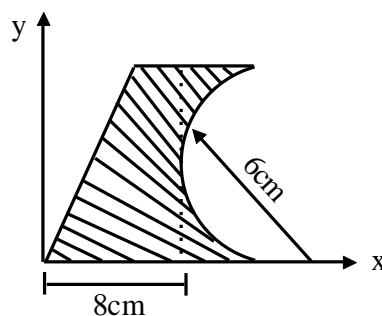
5. a) Determine moment of Inertia of shaded area about the specified x and y axis. Also about centroidal axis x & y. 10



- b) Explain perpendicular axis theorem & parallel axis theorem. 6

**OR**

6. a) Determine moment of inertia of shaded area about y axis. 12



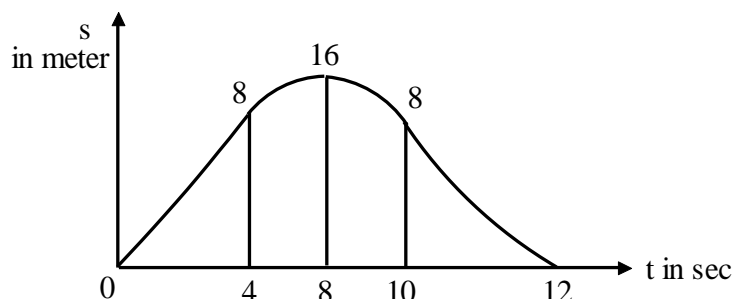
b) Explain centroid & polar moment of Inertia. 4

7. a) A ball is thrown vertically into the air at 36 m/s after 3 sec, another ball is thrown vertically, what initial velocity must be second ball have to pass the ball of 30 meter from the ground. 12

b) State and explain D'Alembert's principle. 4

OR

8. a) One cycle of an s-t curve is shown in figure the curve is second degree parabola and have zero slope at  $t = 0$ ,  $t = 8$  and  $t = 12$  sec. 12



- i) sketch the V-t & a-t curve
- ii) compute  $V_{\max}$  &  $a_{\max}$ .

b) Explain the term "elastic impact and coefficient of restitution". 4

9. a) Determine the length of a simple pendulum whose period is 1 sec. 8

b) Write note on free Vibration. 8

OR

10. a) What is damping? Explain critical damping. 8

b) What are types vibrations. 8

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