

# BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

## December 2016 Semester End Main Examinations

Course: Structures- I  
Course Code: 09AT1DCSTR

Duration: 3 hrs  
Max Marks: 100  
Date: 16.12.2016

Instructions: Answer five full questions choosing one full question from each module

### MODULE - 1

- 1 a) Define force and write the characteristics of force 06
- b) Define the following 06
  - i) Resultant of a force
  - ii) Composition of a force
  - iii) Resolution of a force
- c) Find the moment of force about point 'P' shown in **Figure-1** 02

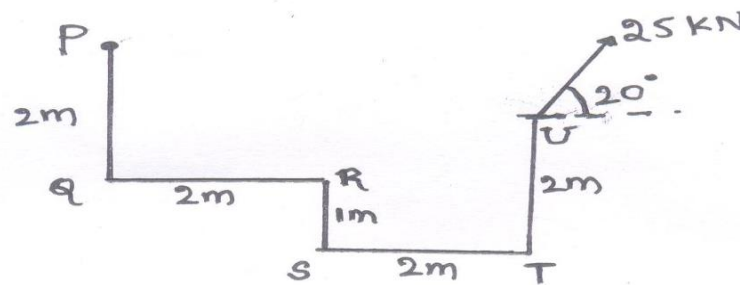


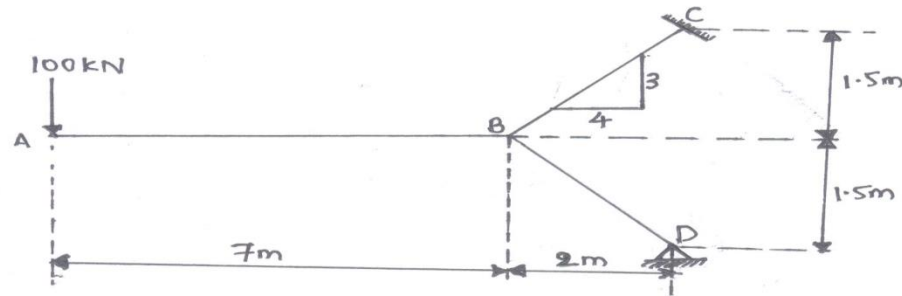
Figure-1

- d) Give the classification of systems of forces, with sketches 06

### MODULE - 2

- 2 a) Define the following 06
  - i) Equilibrium and Equilibrant
  - ii) Statically determinate and indeterminate structures
  - iii) Principle of Transmissibility of forces
- b) With the neat sketches, Explain different beams based on supports 06

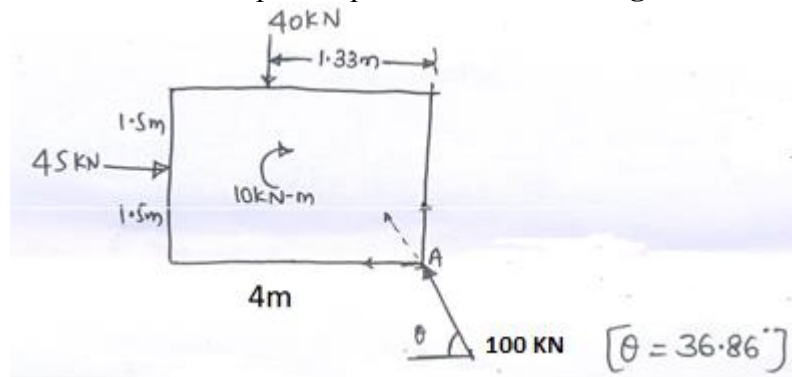
- c) Determine the tension in the string BC and the reaction at the hinge support 'D' for the Beam ABD shown in **Figure-2** 08



**Figure-2**

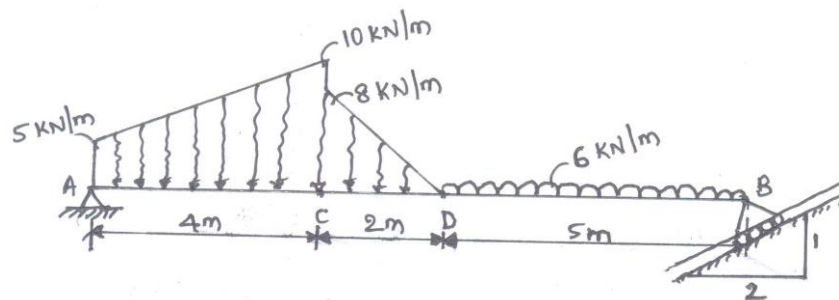
**OR**

- 3 a) Find the magnitude and direction of the resultant force. Also find X and Y intercept Of the Resultant force with respect to point 'A' shown in **Figure-3** 10



**Figure-3**

- b) For the beam with loading shown in **Figure-4**, determine the reaction at supports 10

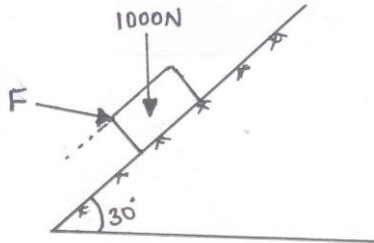


**Figure-4**

### MODULE - 3

- 4 a) Define coefficient of friction. Show that the co-efficient of friction is tangent of the angle of friction 06

- b) A block weighing 1000N is placed on a  $30^\circ$  inclined plane with co-efficient of friction 0.25 shown in **Figure-5**. Determine the horizontal force required to be applied for **14**
- i) the impending motion down the plane, and
- ii) the impending motion up the plane



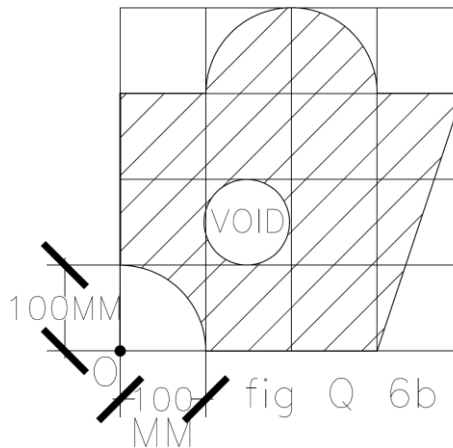
**Figure-5**

**OR**

- 5 a) State the laws of Dry Friction **04**
- b) Define **04**
- i) Angle of repose
- ii) Cone of friction
- c) A ladder 4m in length and weighing 250N rests against a vertical wall and floor with an inclination of  $60^\circ$  with the floor. Coefficient of friction between floor and ladder is 0.3 and that between wall and ladder is 0.25. Determine the horizontal force required to be applied at the foot of the ladder to permit a man weighing 650N to reach to the top of the ladder without slipping **12**

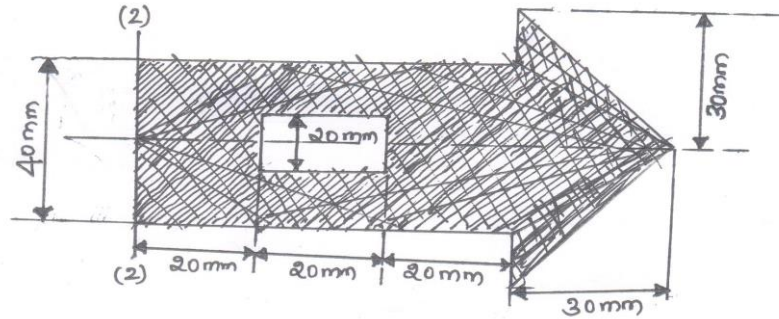
#### **MODULE - 4**

- 6 a) Determine the centroid of semi-circular lamina **08**
- b) Determine the centroid of the hatched portion for the plane lamina shown in fig. Q 6b, w.r.t 'O' **12**



## MODULE - 5

- 7 a) State and prove parallel axis theorem 06  
b) Find the radius of gyration of the shaded area shown in **Figure-8** about an axis 14  
Normal to symmetrical axis (2)-(2)



**Figure-8**

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