

BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

January 2017 Semester End Make Up Examinations

Course: ENGINEERING MECHANICS
Course Code: 14CV1ICENM

Duration: 3 hrs
Max Marks: 100
Date: 17.01.2017

Instructions: Question No. 1 is compulsory.

Answer any 4 full questions from question No. 2 to question No. 6.

Assume missing data suitably.

- 1 Answer the following 5x4=20
- Describe free body diagram and continuum
 - Describe with neat sketches various types of supports and reactions at supports.
 - List the assumptions made in the analysis of plane pin jointed frames
 - Show that the path traced by a projectile is parabola.
- 2 a) State and prove Varignon's Theorem 06
- b) Evaluate the moment of forces acting on the bracket as shown in Fig Q.2(b) about "A". Use vector approach only 04

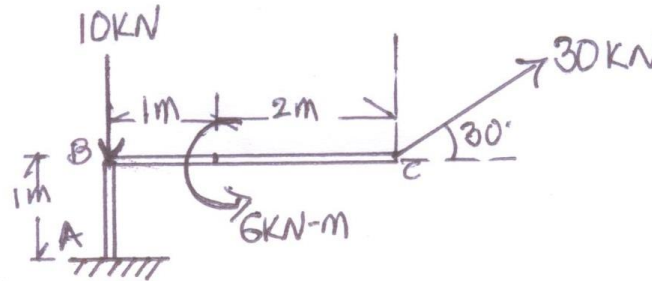


Fig Q.2(b)

- c) Find the magnitude and position of the resultant force for the set of forces shown in Fig Q.2(c). Also replace the resultant with a force and a couple at "A". Use Vector approach only 10

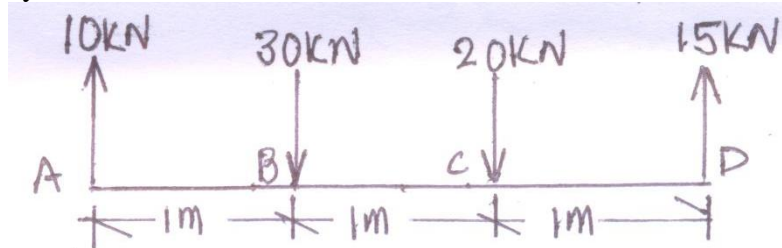


Fig Q.2(c)

- 3 a) Evaluate the reactions at supports for the beam loaded as shown in Fig Q.3(a). 12

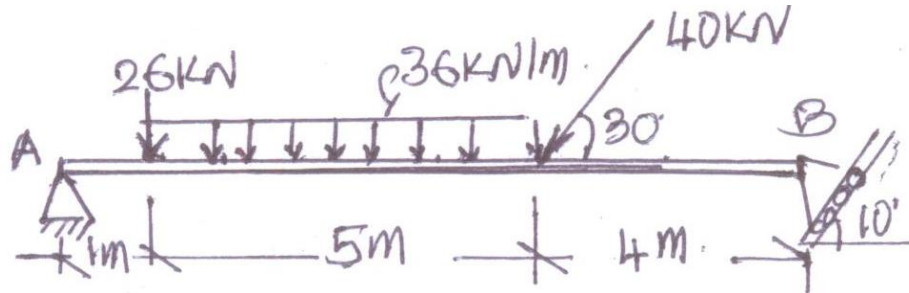


Fig Q.3(a)

- b) From first principles obtain the centroid of a sector of a circle. 08

- 4 a) State and prove parallel axis theorem. Define radius of gyration 08
 b) Determine the moment of inertia of the plane lamina shown in Fig Q.4(b) about the polar axis passing through its centroid. 12

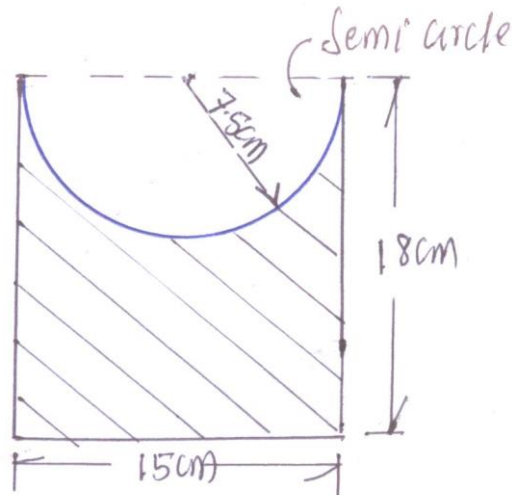


Fig Q.4(b)

- 5 a) Using method of joints evaluate the forces in the members of the truss shown in Fig Q.5(a). 10

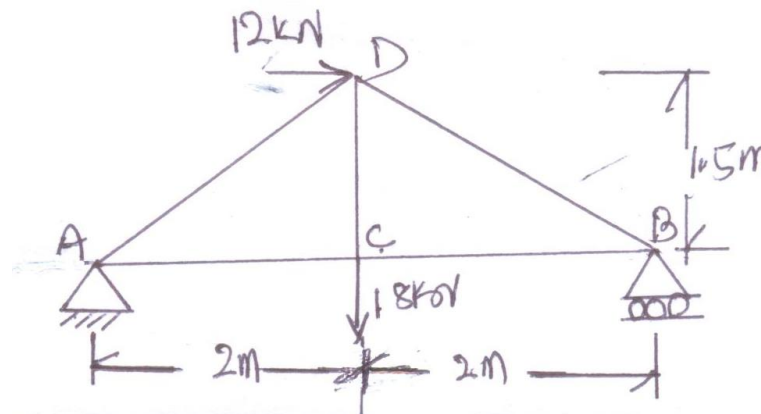


Fig Q.5(a)

- b) A block of weight 500 N is suspended by a rope which passes over two drums 'A' and 'B' as shown in Fig Q.5(b). The drum "B" is smooth and the coefficient of friction between the rope and the drum "A" is 0.25. The rope is wrapped on drum A over 0.25 times of its surface. Determine the maximum and minimum values of "P" for which the limiting equilibrium exists. **10**

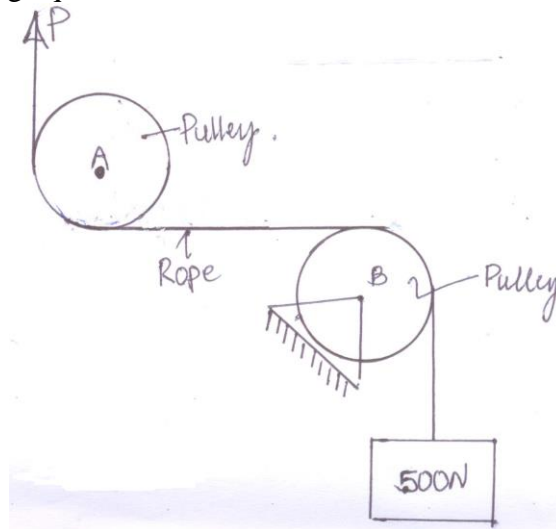


Fig Q.5(b)

- 6 a) A bullet of mass 81 g and moving with a velocity of 300m/s is fired into a log of wood and it penetrates to a depth of 10cm. If the bullet moving with the same velocity were fired into a similar piece of wood 5cm thick, with what velocity would it emerge? Find also the force of resistance assuming it to be uniform **10**
- b) A train weighing 3000 kN is moving down a slope of 1 in 150 at a constant speed of 18kmph and develops a power of 35kW. When it is pulled up the slope at the same speed, what is the power developed by the engine? Also calculate the tractive resistance when the engine is moving down. **10**
