

**SUBJECT CODE NO:- P-232**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**F. E. (All) (CGPA) Examination May/June 2017**  
**Engineering Mechanics**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Question numbers one and six are compulsory
  - ii) Attempt any two questions from each section from remaining.
  - iii) Figures to the right indicates full marks
  - iv) Assume suitable data if necessary

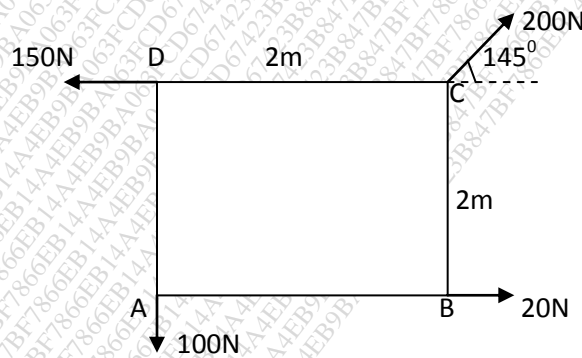
Section A

Q.1 Attempt any five from the following

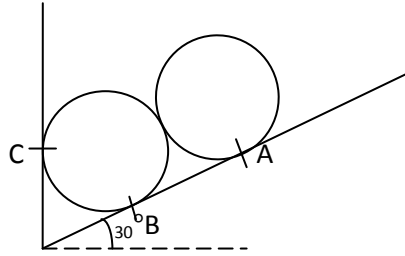
- 1. State law of parallelogram of forces
- 2. Explain classification of coplanar force system
- 3. State Lami's theorem
- 4. Define limiting frictional force
- 5. State principle of virtual work
- 6. State parallel axis theorem
- 7. Define angle of friction
- 8. Enlist type of loads on beams

10

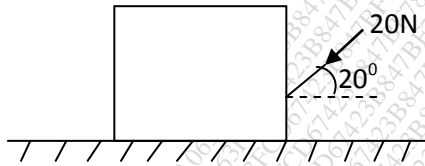
Q.2 a) Find magnitude, direction and position of resultant force for the force system shown in figure from point A. 07



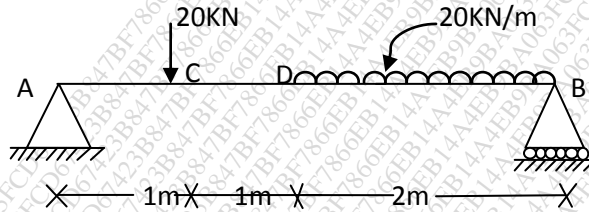
b) Two identical rollers each of weight 500N are supported by inclined plane and vertical wall as shown in fig.08 find reaction at the points A,B and C for the equilibrium given



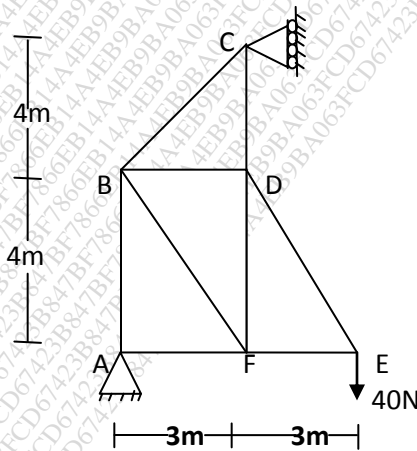
- Q.3 a) A body of weight 70N is placed on a rough horizontal plans to just move the body on the horizontal plane, 09  
A push of 20N inclined at  $20^\circ$  to the horizontal plane is required find coefficient of friction



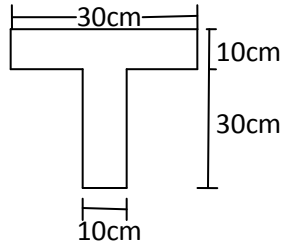
- b) Determine the reaction at the support A and B of the beam loaded as shown in fig. use principle virtual 06  
work method



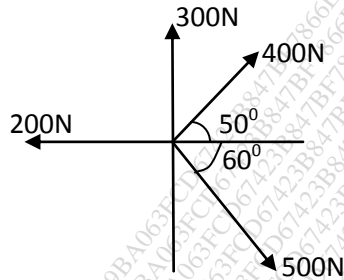
- Q.4 a) Write down the assumptions in analysis of truss. 03  
b) Determine the forces in all members of a truss shown in fig. 12



- Q.5 a) Find the moment of inertia of a T-section shown in figure. About x-axis and y axis through the centroid of 08  
the section



b) A concurrent force system is shown in the figure. Find the resultant of the force system. 07



Section B

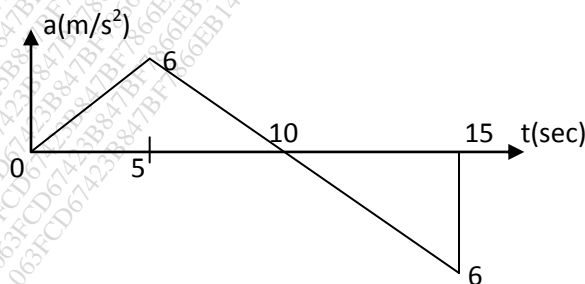
Q.6 Attempt any five questions from the following 10

1. Define velocity of projection and angle of projection
2. State D' Alembert's principle
3. State law of conservation of momentum
4. Define a) work b) power
5. The initial velocity of a body moving with a retardation of  $4\text{m/s}^2$  is  $40\text{ m/s}$  body comes to rest in 10 sec. find the distance travelled in given time interval
6. Define work-energy principle
7. Explain types of impact

Q.7 a) A stone dropped into a well is heard to strike the water in 5 sec. find the depth of the well assuming the velocity of sound to be  $300\text{m/s}$  07

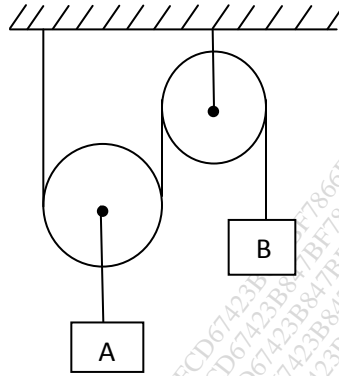
- b) The equation of motion of a particle moving in straight line is given by the equation  $S = 20t - 4t^2 + 2t^3$  08  
 where 'S' is the distance covered. Find
1. Velocity and acceleration at start
  2. Time when particle reaches its maximum velocity
  3. Maximum velocity of particle

Q.8 a) Particle starting from rest moves in straight line with a-t relationship as shown fig. draw v-t and s-t diagram. 08

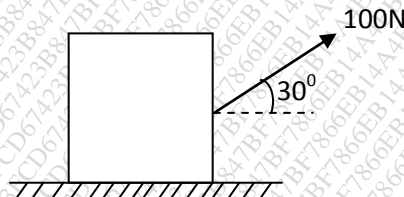


b) A bullet is fired from a gun with an initial velocity of  $250\text{m/s}$  to hit a target. The target is located at a horizontal distance of  $3750\text{m}$  and  $625\text{m}$  above the gun. Determine minimum angle of projection so that

- Q.9 a) Determine tension in the string and acceleration of the blocks A and B having weights 2100N and 700N respectively, connected by an inextensible string shown in fig. Assume pulleys are frictionless and weightless



- b) Direct central impact occurs between a 30kg body moving to the right with the velocity of 6m/s and 15kg body moving to the left with velocity of 10m/s. find the velocity of each body after impact if  $e=0.8$
- Q.10 a) A block having  $Wt=2500N$  rest on a horizontal plane for which  $\mu = 0.2$ . Block is pulled by a force as shown in figure. Find velocity of block after it moves 30m starting from rest. If 1000N force shown in figure is then removed how much further it will move. Use work-energy principle.



- b) A car starts from rest on a curve road of 250m radius and  $acc^t$  at constant tangent  $acc^n$  is  $0.6m/s^2$ . Determine the distance and time for which car will travel if the magnitude of total  $acc^n$  is  $0.75m/s^2$