

Total No. of Printed Pages:04

**SUBJECT CODE NO: H-122**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**F. E. (All)**  
**Engineering Mechanics**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

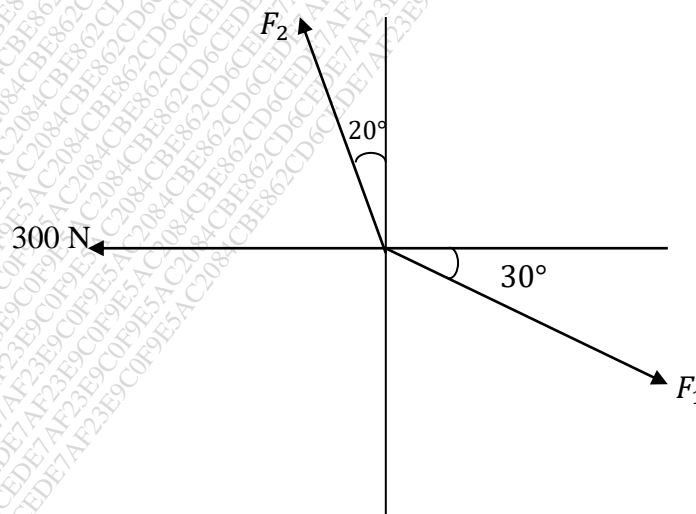
N.B

Please check whether you have got the right question paper.

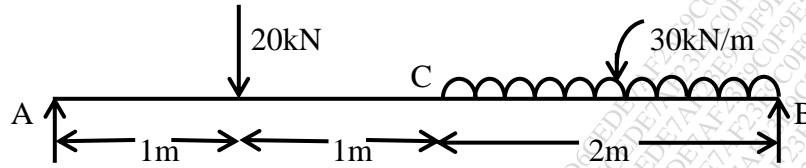
- i) Question numbers one & six are compulsory.
- ii) Attempt any two questions from each section from remaining.
- iii) Figures to the right indicate full marks.
- iv) Assume suitable data if necessary.

**SECTION – A**

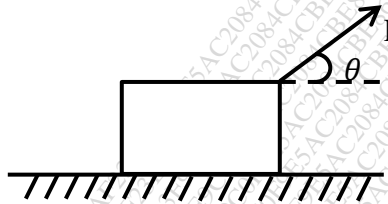
- Q.1 Attempt any FIVE from the following. 10
- a) State the principle of transmissibility of forces.
  - b) State Lami's theorem.
  - c) Define the term free body diagram
  - d) Define coefficient of friction.
  - e) Define the term friction.
  - f) What are the assumptions made in the analysis of simple truss.
  - g) Enlist the different type of support.
  - h) What do you mean by resolution of force?
- Q.2 a) The resultant of the two forces, when they act at an angle of  $60^\circ$  is 14 N. if the same forces are acting at right angles, their resultant is  $\sqrt{136}$  N. Determine the magnitude of the two forces. 07
- b) Determine the magnitude of  $F_1$  and  $F_2$  so that the particle is in equilibrium. 08



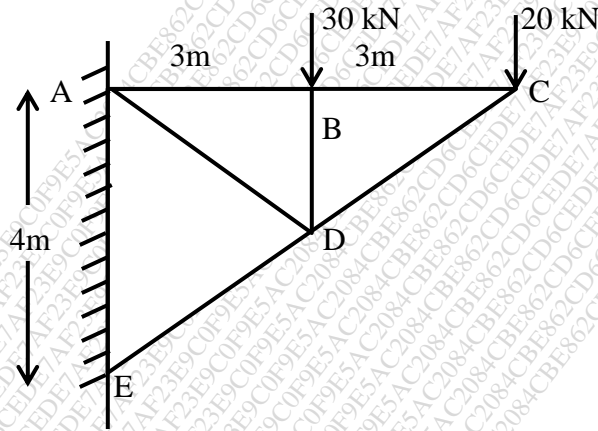
- Q.3 a) Find the support reactions for the beam shown in fig. by virtual work method. 07



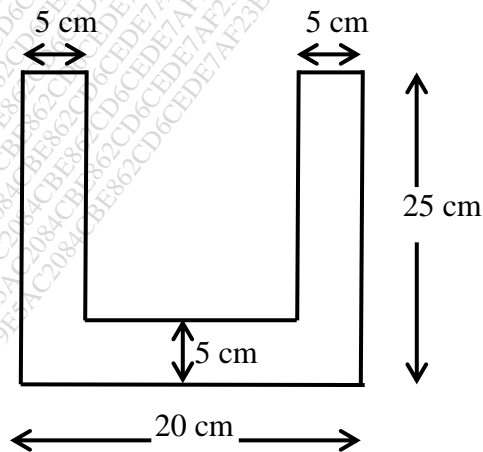
- b) Find the minimum force P required to move the block A weighing 20 kN. If  $\mu = 0.25$ . Find  $\theta$  also. 08



- Q.4 Determine the forces in each member of the truss & state if the members are in tension OR compression. 15



- Q.5 Determine moment of inertia of the area about its centroidal axes. Also determine centroidal polar moment of inertia. 15



## SECTION – B

- Q.6 Attempt any FIVE questions from the following. 10
- Define the term range of projectile.
  - State law of conservation of momentum.
  - Define the term Angular acceleration.
  - State  $D'$  Alembert's principle.
  - Define the coefficient of restitution.
  - Find the power of an engine, which can do a work of 1200 joules in 8 seconds.
  - Distinguish clearly between mass & weight.
  - Define momentum.
- Q.7 a) A body is moving with uniform acceleration and covers 20m in 4<sup>th</sup> sec. and 30 m in 8<sup>th</sup> second. Determine 07
- The initial velocity of the body.
  - Acceleration of the body.
- b) A particle moves along a straight line so that it's displacement in Meter from a fixed point is given by, 08
- $$s = 2t^3 + 4t^2 - 6t + 8$$
- Find :-
- Velocity at start
  - Velocity after 5 second
  - Acceleration at start
  - Acceleration after 5 seconds.
- Q.8 a) A particle is projected in air with a uniform velocity 60 m/s at an angle of 45° with the horizontal. 07
- Find :-
- horizontal range
  - maximum height attained by particle
  - time of flight
- b) A wheel, rotating about a fixed axis at 20 r.p.m, is uniformly accelerated for 70 seconds, during which time it makes 50 revolution. 08
- Find:-
- Angular velocity at the end of this interval and
  - Time required for the speed to reach 100 revolution per minute.
- Q.9 a) Two bodies of weight 30 N and 15 N are connected to the two ends of a light in extensible string, passing over smooth pulley. The weight of 30 N is placed on a smooth horizontal surface while the weight of 15 N is hanging free in air. 07
- Find:-
- The acceleration of the system
  - The tension in the string take  $g = 9.81 \text{ m/s}^2$

b) A bullet of mass 50 gm is fired into a freely suspended target to mass 5 kg. on impact, the target moves with a velocity of 7 m/s along with the bullet in the direction of firing. Find the velocity of bullet. 08

Q.10

a) A block of wood of weight 1000 N is placed on a smooth inclined plane which makes an angle of  $30^\circ$  with the horizontal. Find the work done in pulling the block up for a length of 5m. 07

b) Find the angular acceleration of flywheel of an engine, which weighs 1500 N and has a radius of gyration 0.6m, if the wheel is subjected to a torque of  $2000 \text{ N.m}$  Take  $g = 9.8 \text{ m/s}^2$ . 08