

2E2005

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**B.Tech. I Year II Sem. Main/ Back June-July
Examination, 2015****205 Engg. Mechanics**

Time: 3 hours

Maximum Marks: 80

Min. Passing Marks: 26

Note: Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary). Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL2. NIL**UNIT-I**

- Q. 1 (a) Determine the magnitude and direction of the resultant a system of four coplanar concurrent forces as shown in figure-1. 8

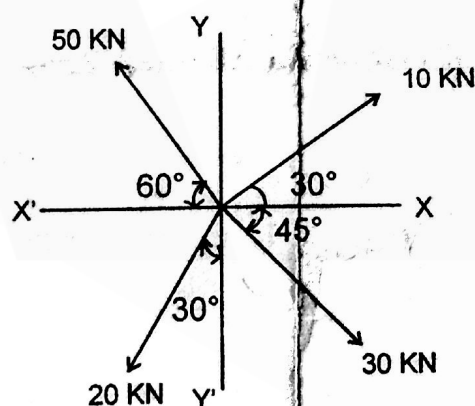


Figure-1

- (b) Determine the support reactions for the beam loaded as shown in figure-2. 8

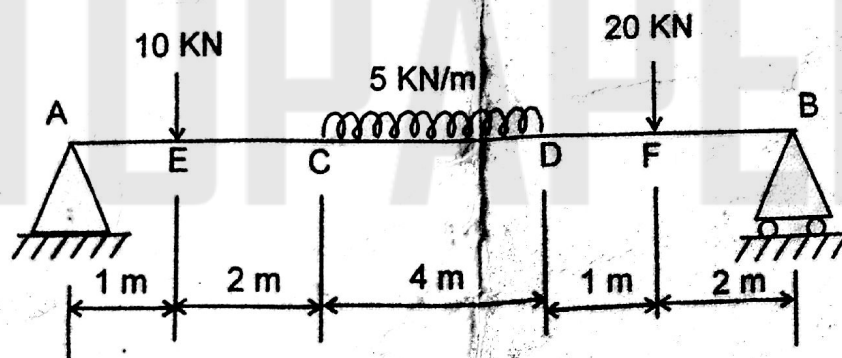


Figure-2

[Contd.]

(1)

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- Q. 1 (a) Use the principle of virtual work to determine the support reactions for the beam loaded as shown in figure-3. 8

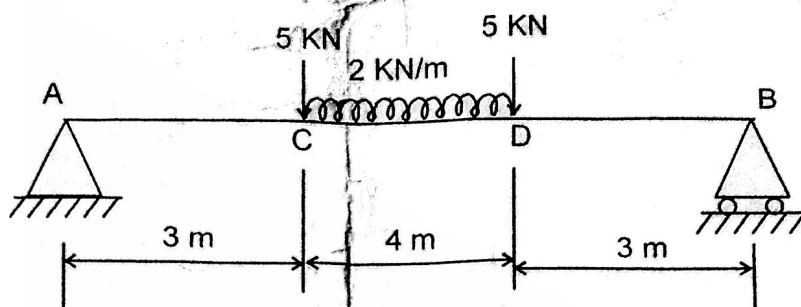


Figure-3

- (b) Write short notes on the following:

- (i) Lami's theorem
(ii) Varignon's theorem

4×2 = 8

UNIT-II

- Q. 2 Determine the polar moment of inertia of the I-section given in figure-4, about X-X axis and Y-Y axis both. (All dimensions are in mm.) 16

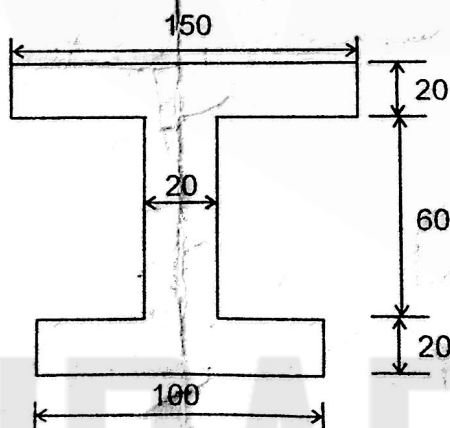


Figure-4

- Q. 2 (a) An effort of 200 N is applied through a distance of 6 m to lifting machine to raise a load through a distance of 60 cm. If the efficiency of the lifting machine is 80%, determine:

(2)

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- (i) Load lifted by the machine
- (ii) Mechanical advantage
- (iii) Velocity ratio

$$(2^n - 1)$$

8

- (b) There are four pulleys in a third system of pulleys. An effort of 200 N is required to lift an unlock weight. If the efficiency of this machine is 70%, find the weight lifted. 8

UNIT-III

- Q. 3 (a) A ladder of 5 m length and 50 N weight rest on a horizontal ground and against a smooth vertical wall at an angle of 60° with the vertical. when a man of 100 N stands on a ring 2 m from the foot of the ladder, it is on the point of slipping. Determine the coefficient of friction between the ladder and ground. 8
- (b) A flat belt transmits 20 kW power from a pulley of 100 cm diameter running at 300 rpm. The angle of lap on the pulley is 160° . Find the width of the belt if the maximum tension is limited to 200 N/cm. Take $\mu = 0.3$. 8

OR

- Q. 3 (a) Derive an expression the total length of the belt required for open belt drive. 8
- (b) Write short notes on the following:
- (i) Angle of Repose
 - (ii) Effect of Slip on Belt Drive

UNIT-IV

- Q. 4 (a) A stone is projected with such an angle with horizontal, the range is 4 times the greatest height attained by the body. (Range is 200 m) Find:
- (i) Angle of projection
 - (ii) Velocity of projection
 - (iii) Time of flight

8

- (b) A parachute of 300 N weight falling with uniform acceleration from rest descends 5 m in first 3 second. Determine the resultant air force on the parachute. 8

OR

- Q. 4 (a) A ball is dropped from a building of great height. Another ball is dropped from the same point exactly one second later. Find the separation between the balls after three seconds of the drop second ball. 8
- (b) Find the acceleration and tension in the string of the system shown in figure-5. Coefficient of the friction $\mu = 0.2$ for all planes of the contact. Pulley is smooth. Also determine the velocity of the system in 5 seconds after starting from rest. 8

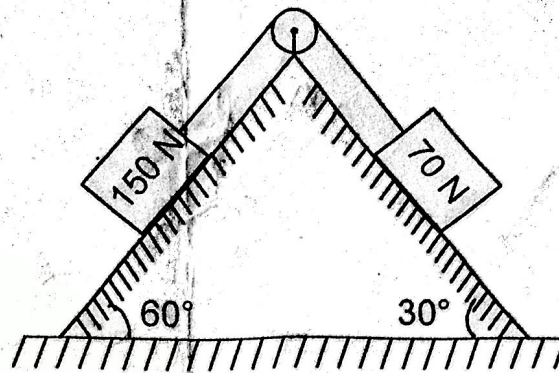


Figure-5

UNIT-V

- Q. 5 (a) A block of weight 100 N slides along an inclined plane making an angle 30° with horizontal having initial velocity of 2 m/s. The distance travelled by the body along the plane is 2 m and after that it strikes the spring whose stiffness is 50 N/mm. Taking $\mu = 0.2$. Find the compression of the spring. 8

(b) Write short notes on the following:

(i) Principle of work and energy

(ii) Principle of linear impulse and momentum

4×2 = 8

OR

- Q. 5 (a) Two balls A and B of mass 200 gm each, moving in opposite direction with their velocities 3 m/sec. and 2 m/sec. respectively, collide elastically. If no energy is lost during the collision, determine their velocities after collision. 8

(b) Write short notes on the following:

(i) Law of Conservation of Energy

(ii) Principle of angular momentum

4×2 = 8

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