

2E2005

Roll No. \_\_\_\_\_

Total No of Pages: 3

2E2005

B. Tech. II-Sem. (Back) (Back) Exam., Oct.-Nov. - 2020

205 Engineering Mechanics

Time: 2 Hours

Maximum Marks: 48  
Min Passing Marks: 15

Instructions to Candidates:

Attempt **three** questions, selecting **one** question each from any three 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.  
(Mentioned in form No.205)

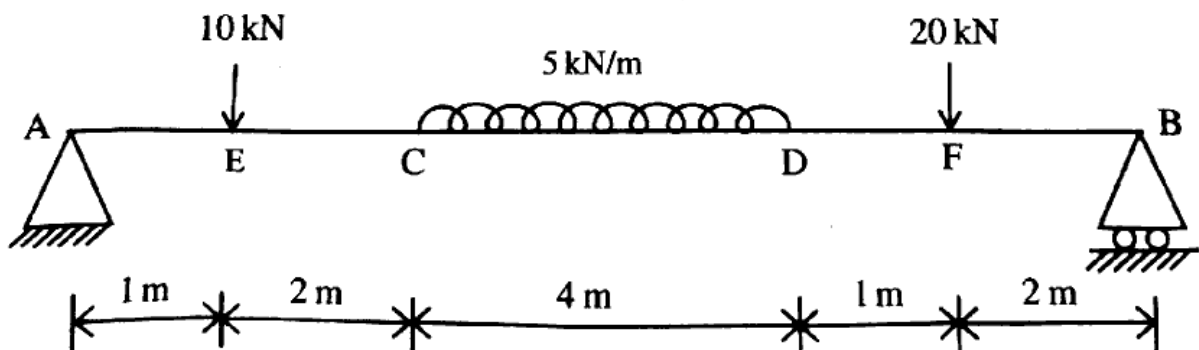
1. NIL

2. NIL

### UNIT-I

Q.1 (a) Describe force and state its application. Give a detailed classification of system of force. [6]

(b) Determine the support reactions for the beam loaded as shown in figure. [10]



[2E2005]

Page 1 of 3

[6560]

**OR**

Q.1 (a) State and prove Varignon's theorem. [8]

(b) Write short notes on the following - [2×4=8]

(i) Lami's theorem

(ii) Principle of virtual work

## **UNIT- II**

Q.2 (a) Explain the reversibility and law of machine. [8]

(b) Determine the moment of inertia of a thin elliptical disk of mass  $m$ , having axial radius of  $a$  and  $b$ . [8]

**OR**

Q.2 (a) There are four pulleys in a third system of pulleys an effort of 200 N is required to lift an unknown weight. If the efficiency of this machine is 70%, find the weight lifted. <https://www.rtuonline.com> [8]

(b) A machine lifts a load of 250 N by an effort of 160 N at another instant the same machine lifts the load of 375 N by an effort of 175 N. If the velocity ratio of the machine is 20, determine - [8]

(i) Law of machine

(ii) Efficiency of the machine at 375 N

(iii) Efforts lost in friction at 250 N load

## **UNIT- III**

Q.3 (a) Derive an expression for the total length of the belt required for open belt drive. [8]

(b) Write short notes on the following - [2×4=8]

(i) Angle of Repose

(ii) Effect of slip on belt drive

**OR**

Q.3 (a) Derive an expression for the limiting ratio of tension in a V-belt over pulley. [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  $160^\circ$ . Find the width of the belt if the maximum tension is limited to 200 N/cm. Take  $\mu = 0.3$ . [8]

### UNIT- IV

- Q.4 (a) Find range, time of flight and maximum height for a projectile motion. [8]  
(b) Define and explain Newton's law of motion for rotational motion. [8]

**OR**

- Q.4 (a) A parachute of 300 N weight falling with uniform acceleration from rest descends 5m in first 3 second. Determine the resultant air force on the parachute. [8]  
(b) Find the acceleration and tension in the string of the system shown in figure. 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]

### UNIT- V

- Q.5 (a) Write short notes on the following – [2×4=8]  
(i) Principle of work and energy  
(ii) Principle of linear impulse and momentum  
(b) Two balls A and B of mass 200gm each, moving in opposite direction with the velocities 3m/sec and 2m/sec respectively collide elastically. If no energy is lost during the collision, determine their velocities after collision. [8]

**OR**

- Q.5 (a) A block of weight 100 N slides along an inclined plane making an angle  $30^\circ$  with horizontal having initial velocity of 2 m/s. The distance travelled by the body along the plane is 2m and after that it strikes the spring whose stiffness is 50 N/mm. Take  $\mu = 0.2$ . Find the compression of the spring. [8]  
(b) Write short notes on the following – [2×4=8]  
(i) Law of conservation of energy  
(ii) Principle of angular momentum

-----