

(Following Paper ID and Roll No. to be filled in your
Answer Books)

Paper ID : 154203

Roll No.

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B.TECH.

Theory Examination (Semester- II) 2015-16

ENGINEERING MECHANICS

Time : 3 Hours

Max. Marks : 100

- Note :**
- 1) All symbols have usual meaning.
 - 2) Assume any relevant data, if missing.

Section-A

- 1. Attempt all questions. All questions carry equal marks.**
(2×10=20)

- (a) Enumerate characteristics of a force.
- (b) Explain the term Limiting friction.
- (c) What is polygon Law of forces?
- (d) Give two example free body diagram.
- (e) Define Belt drive. What are the different types of belt drives?

- (f) Define the terms: Angle of friction, Coefficient of friction.
- (g) What is Rectilinear motion?
- (h) State the Perpendicular axis theorem.
- (i) State D Alemberts principle.
- (j) Define the term Ideal machine with reference to Lifting machines.
- (k) What do you mean by momentum of a body and angular momentum of a body?
- (j) Explain the term rigid body.

Section-B

2. Attempt any questions. All questions carry equal marks.
(5×10=50)

- (a) Describe the following :
 - (i) Angle of friction
 - (ii) Laws of motion

- (b) Derive an expression for the length of belt for an open belt drive.
- (c) Explain the following:
- (i) Mechanical Advantages
 - (ii) Velocity Ratio
- (d) A flywheel is rotating at 200 rpm and after 10 seconds it is rotating at 160 rpm. If the retardation is uniform, determine number of revolution made by the flywheel and the time taken by the flywheel before it comes to rest from the speed of 200 rpm.
- (e) A bullet of mass 81 gm and moving with a velocity of 300 m/s is fired into a log of wood and it penetrates to a depth of 10 cm. If the bullet moving with the same velocity, were fired into a similar piece of wood 5 cm thick, with what velocity would it emerge? Find also the force of resistance, assuming it to be uniform.
- (f) Two bodies X and Y of mass 80 Kg and 20 Kg are connected by a thread and move along a rough horizontal plane under the action of force 500 N applied to the first body of mass 80 Kg as shown in fig. The

coefficient of friction between the sliding surfaces of the bodies and the plane is 0.3. Determine the acceleration of the two bodies and the tension in the thread, using D'Alembert's principle.



- (g) Explain the difference between a reversible and self locking machine. What load will be lifted by an effort of 12 N if the velocity ratio is 18 and the efficiency of the machine at this load is 60%? If the machine has the constant frictional resistance, determine the Law of machine and find the effort required to run the machine at (i) no load and (ii) load of 90 N.

- (h) Explain the following :

(i) Work and Energy,

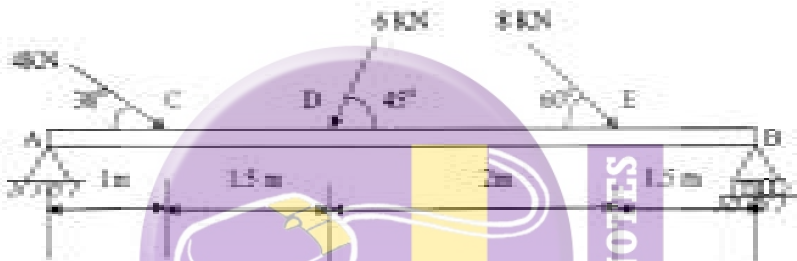
(ii) Dynamic Equilibrium,

Section-C

Attempt all questions. All questions carry equal marks.

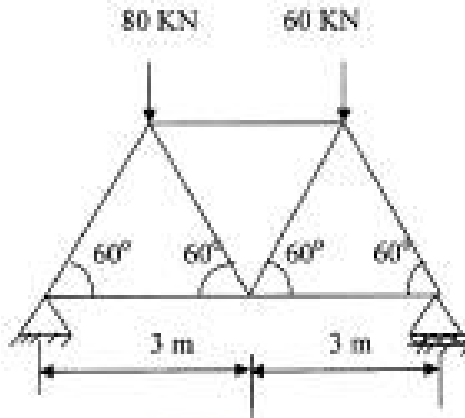
(2×15=30)

3. A beam AB of span 6 m is hinged at A and supported on rollers at end B and carries load as shown in figure. Determine the reactions at A and B.



Explain the following :

- (i) Various types of loads
 - (ii) Hinge support and roller support
 - (iii) Concurrent and Non concurrent forces
4. Determine the forces in all the members of the truss shown in figure. Indicate the nature of the forces also.



5. A ladder, 4m long leans against a smooth vertical wall at an angle of 60° with the horizontal as shown in figure. The weight at the ladder is 800 N. When a person weighing 700 N stands at 1.2 m from the bottom of the ladder, the ladder is just about to slide. Calculate the coefficient of friction between the ladder and the floor.

