Ex/PE/T/123/2018

B.E. Power Engg., First Year Second Semester Examination-2018

Subject: Engineering Mechanics-II

Full Marks: 100 **Time: 3 Hours**

Answer Q.No.**1** and any **five (5)** from the rest. Each question from Q.2 to Q.8 carries **18** Marks.

1. MCQ type questions. Marks:1 x 10=10

(i) Equation of motion of a particle is $S = 2t^3 - t^2 - 2$ where S is meters and t in seconds. Acceleration of the particle after 1 sec will be

A. 8 m/s^2 B. 9 m/s^2 C.10 m/s^2 D. 5 m/s^2

(ii) Vehicle will accelerate as long as

A. air resistance is greater than thrust
B. air resistance is greater than inertia
C. thrust is greater than air resistance and friction
D. friction is greater than thrust

(iii) If there is no net force acting on body, then its acceleration is

A. Zero B. constant C. increasing D. decreasing

(iv) An elevator of mass M is pulled upwards at constant velocity by a cable. What is the tension in the cable (neglecting the mass of the cable) ?

A. less than zero B. between zero and Mg C. equal to Mg D. greater than Mg E. zero

(v) When a body slides down an inclined surface the acceleration (f) of the body is given by

A. $f = g$, B.$f = gSin\Theta$ C. $f = gCosO$ D. $f = gtanO$

(vi) Range of projectile will be minimum if angle of projectile is

A. 0° B. 30° C. 45° D. 60°

(vii) Output of a truck is 4500 J and its efficiency is 50%, input energy provided to truck is

A. 5000 J B. 900 J C. 9000 J D. 500 J

(viii) A bus travels with a constant force of 5000 N and work done by bus is 2500 J, distance travelled by bus is

A. 2 m B. 0.5 m C. 7500 m D. 2500 m

(ix) A coolie carries a load of 500 N to a distance of 100 m. The work done by him is

A. 1.5N B. 50,000 Nm C. 0 D. 1/5N

(x) If the momentum of a ball is doubled, then the kinetic energy is

A. 0.5 times larger. B. 2 times larger. C. 3 times larger. D. 4 times larger. E. 5 times larger.

2. The motion of a particle moving in a straight line is given by expression, $\mathbf{S} = t^3 - 3t^2 + 2t + 5$, where **S** is the displacement in meters and **t** is the time in seconds. Determine: (i) velocity and acceleration after 4 seconds (ii) maximum or minimum velocity and corresponding displacement, (iii) time at which velocity is zero.
3. On an incline plane, a man at A can fire both upward and downward at a velocity 220 m/s. Determine the range BC. [Fig.1]
4. A body weighing 300N is pushed up a 30° plane by a 400 N force acting parallel to the plane. If the initial velocity of the body is 1.5 m/sec and coefficient of friction is μ=0.2, what velocity will the body have after moving 6 m? Use Work-Energy Equation.
5. A 800N man, moving horizontally with a velocity of 3 m/s, jumps off the end of a pier into a 3200 N boat. Determine the horizontal velocity of the boat, (i) if it had no initial velocity and (ii) if it was approaching towards the pier with an initial velocity of 0.9 m/s.
6. Ship A is approaching a port from S40°W direction at 20 kmph. When ship A was 20 km from the port, ship B leaves the port at N60°W with a velocity of 25 kmph. Determine the relative velocity of A with respect to B. When are they at least distance?
7. Draw the SFD and BMD for a simply supported beam subjected to a uniformly distributed load over the entire span [Fig.2]
8. Write short note on the followings

   (i) Castigliano's theorem (ii) Central force Motion

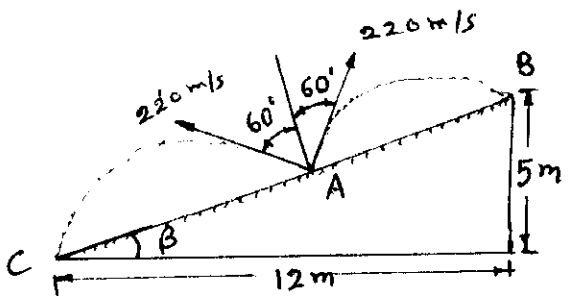

Fig.1

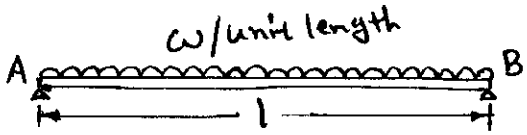

Fig.2