Applied Materials Latest 2011-2012 Mechanical Engg Questions

1 The elevator E and its freight have a total mass of 400 kg. Hoisting is provided by the motor M and the 60-kg block C. If the motor has an efficiency of e = 0.6, determine the power that must be supplied to the motor when the elevator is hoisted upward at a constant speed of vE = m/s.

AP = 22.2 kW-Ans
B.P = 13.34 kW
C.P = 26.2 kW
D.P = 30.1 kW
2.A car having a mass of 2 Mg strikes a smooth, rigid sign post with an initial speed of 30 km/h. To stop the car, the front end horizontally deforms 0.2 m. If the car is free to roll during the collision, determine the average horizontal collision force causing the deformation.

A.Favg = 9000 kN
B.Favg = 4500 kN
C.Favg = 347 kN-Ans
D.Favg = 694 kN
3.When at A the bicyclist has a speed of vA = ft/s. If he coasts without pedaling from the top of the hill at A to the shore of B and then leaps off the shore, determine his speed at B and the distance x where he strikes the water at C. The rider and his bicycle have a total weight of 150 lb. Neglect the size of the bicycle and wind resistance.

A.vB = 35.0 ft/s, x = 41.2 ft-Ans
BvB = 35.0 ft/s, x = 36.1 ft
CvB = 40.1 ft/s, x = 46.5 ft
D.vB = 40.1 ft/s, x = 52.0 ft

4The firing mechanism of a pinball machine consists of a plunger P having a mass of 0.25 kg and a spring of stiffness k = 300 N/m. When s = 0, the spring is compressed 50 mm. If the arm is pulled back such that s = 100 mm and released, determine the speed of the 0.3 kg pinball B just before the plunger strikes the stop, i.e., s = 0. Assume all sufaces of contact to be smooth. The ball moves in the horizontal plane. Note that the ball slides without rolling.

A.v = 4.47 m/s
B.v = 3.30 m/s-Ans
C.v = 2.34 m/s
D.v = 3.16 m/s

5. The block has a weight of 1.5 lb and slides along the smooth chute AB. It is released from rest at A, which has coordinates of A(5 ft, 0, 10 ft). Determine the speed at which it slides off at B, which has coordinates of B (0, 8 ft, 0).

A.vB = 28.7 ft/s
B.vB = 25.4 ft/s-Ans
C.vB = 26.8 ft/s
D.vB = 29.8 ft/s

6.The roller-coaster car has a speed of 15 ft/s when it is at the crest of a vertical parabolic track. Compute the velocity and the normal force it exerts on the track when it reaches point B. Neglect friction and the mass of the wheels. The total weight of the car and the passengers is 350 lb.

A.vB = 114.5 ft/s, NB = 29.1 lb-Ans
BvB = 114.5 ft/s, NB = 284 lb
C.vB = 114.5 ft/s, NB = 156.5 lb
D.vB = 114.5 ft/s, NB = 440 lb

7.A motor hoists a 50-kg crate at constant speed to a height of h = 6 m in 3 s. If the indicated power of the motor is 4 kw, determine the motor's efficiency.

A.e = 0.025 (2.5%)
B.e = 0.245 (24.5%)-Ans
C.e = 0.736 (73.6%)
D.e = 0.05 (5.0%)

8.A truck has a weight of 25,000 lb and an engine which transmits a power of 350hp. Assuming that the wheels do not slip on the ground, determine the angle of the largest incline the truck can climb at a constant speed of v = 50 ft/s.

A2 = 8.86E-Ans
B.2 = 24.3E
C.2 = 8.75E
D2 = 26.8E

9.The book A having a weight of 1.5 lb slides on the smooth horizontal slot. If the block is drawn back so that s = 0. Each of the two springs has a stiffness of k = 150 lb/ft and an unscratched length of 0.5 ft.

A.vA = 106.2 ft/s-Ans
B.vA = 120.4 ft/s
C.vA = 160.5 ft/s
D.vA = 107.7 ft/s

10.The coefficient of friction between the 2-lb block and the surface is = 0.2. The block is acted upon by a horizontal force of P. Determine the maximum deformation of the outer spring B at the instant the block comes to rest. Spring B has a stiffness of KB = 20 lb/ft and the "nested" spring C has a stiffness of kc = 40 lb/ft.

A.xB = 1.154 ft
B.xB = 0.790 ft
C.xB = 0.923 ft
D.xB = 1.137 ft-Ans

11. The purpose of jigs and fixtures are to

a. Increased production rate

b. Increased machining accuracy

c. Facilitate interchangeable manufacturing

d. Enable employ less skilled operators

e. All of the above-Answer:

12. Which one of the following methods produces gear by generating process

a. Hobbing-Answer:

b. Casting

c. Punching

d. Milling

e. Broaching

13. Tool life of the cutting tool is most affected by

a. Cutting speed-Answer

b. Tool geometry

c. Cutting feed and depth

d. Microstructure of material being cut

e. Not using coolant and lubricant

14. Metal in machining operation is removed by

a. Tearing chips

b. Distortion of metal

c. Shearing the metal across a zone-Answer

d. Cutting the metal across a zone

e. Pushing the metal with tool

15. A feeler gauge is used to check

a. Radius

b. Screw pitch

c. Surface roughness

d. Unsymmetrical shape

e. Thickness of clearance-Answer

6. Pick up the wrong statement? A refrigent should have

a. Low specific heat of liquid

b. High boiling point-Answer

c. High latent heat of vaporization

d. Higher critical temperature

e. Low specific volume of vapor

17. The property of a material which enable it to resist fracture due to high impact loads is known as

a. Elasticity

b. Endurance

c. Strength

d. Toughness-Answer

e. Resilience

18. Spring index is

a. Ratio of coil diameter to wire diameter-Answer

b. Load required to produce unit deflection

c. Its capability of storing energy

d. Indication of quality of spring

e. Nothing

19. Nodular iron has

a. High machinability

b. Low melting point

c. High tensile strength

d. Good fluidity

e. All of the above-Answer:

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