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Examination October 2020

B.Sc. F.Y (Sem-I)

2147 Physics Paper-I Mechanics Properties of Matter and Sound

Time: One Hour **Max. Marks: 25**

Instructions
Solve any 25 questions

1 Gravitational field at a point on the surface of solid sphere is given by,

(A) E= -MG/r2 (B) E= MG/r2 (C) E= MG/r (D) E= M2G/r

2 If the diameter of the earth becomes half its present value but its average density remains unchanged then how would be the weight of an object on the surface of the earth affected?

(A) The weight of the object remains unchanged (B) The weight is doubled (C) The weight will become one-fourth of the present value (D) The weight is half

3 If the radius of earth were to shrink by one percent (its mass remains the same), then the acceleration due to gravity on the earth's surface _____

(A) would decrease (B) would remain unchanged (C) would become double (D) would increase

4 A body of mass m rises to height h = R/5 from the earth's surface, where R is earth's radius. If g is acceleration due to gravity at earth's surface, the increase in potential energy is

(A) mgh (B) mgh (C) mgh (D) mg

5 In a gravitational field, at a point where the gravitational potential is zero

(A) The gravitational field is necessarily zero (B) The gravitational field is not necessarily zero (C) Nothing can be said definitely about the gravitational field (D) None of these

6 A body of mass 'm ' is placed on the earth's surface. It is taken from the earth's surface to a height h □ 3R . The change in gravitational potential energy of the body is

(A) 2/3mgR (B) mgR (C) 1/2mgR (D) 1/4mgR

7 What is the intensity of gravitational field of the center of a spherical shell

(A) 2 Gm/r (B) g (C) Zero (D) None of these

8 The gravitational potential energy of a body of mass 'm' at the earth's surface mgRe . Its gravitational potential energy at a height Re from the earth's surface will be (Here Re is the radius of the earth)

(A) 2mgRe (B) 2mgRe (C) (mgRe) (D) - (mgRe)

9 If the work done in stretching a wire by 1 mm is 2 J, the work necessary for stretching another wire of the same material but with double the radius of cross-section and half the length by 1 mm is (in joules)

(A) 16 (B) 8 (C) 4 (D) ¼

10 The modulus of elasticity is dimensionally equivalent to

(A) Strain (B) Stress (C) Surface tension (D) Poisson's ratio

11 If by applying a force, the shape of a body is changed, then the corresponding stress is known as

(A) Tensile tress (B) Tensile strain (C) Shearing stress (D) Compressive stress

12 The bulk modulus of a gas is 6 x 103 N/m2 the additional pressure needed to reduce the volume of the gas by 10% is

(A) 300 (B) 400 N/m 2 (C) 100N/m 2 (D) 600 N/m 2

13 According to Hooke's law of elasticity, within elastic limits, if the stress is increased, the ratio of stress to strain.

(A) Increases (B) Decreases (C) Becomes zero (D) Remains constant

14 One end of a steel wire of area of cross-section 3 mm 2 is attached to the ceiling of an elevator moving up with an acceleration of2.2 m/s 2 if a load of 8 kg is attached at its free end, then the stress developed in the wire will be

(A) 8 x 10 6 N/m2 (B) 16 x 10 6 N/m2 (C) 20 x 10 6 N/m2 (D) 32 x 10 6 N/m2

15 The following four wires of length L and the radius are made of same material. Which of these will have the largest extension when the same tension is applied

(A) L = 50 cm, r = 0.25 mm (B) L = 100 cm, r = 0.5 mm (C) L = 200 cm, r = 1 mm (D) L = 3000 cm, r = 1.5 mm

16 Following four wires of length 'L' and cross-sectional area Ais mad of a material of Young's modulus Y if the wire is stretched by an amount x then work done is

(A) F*x (B) F/2L (C) YAx2/2L (D) YAx/L

17 Excess pressure in soap bubble or spherical film is

(A) T/R (B) 4T/R (C) 4R/T (D) 2T/R

18 Excess pressure in hollow cylindrical film is

(A) T/R (B) 4T/R (C) 4R/T (D) 2T/R

19 Cohesive forces are the forces acting...

(A) Between molecules of different materials (B) Between molecules of same material (C) Between water and glass capillary tube (D) Due to gravity

20 The angle of contact between a glass capillary tube of length 10 cm and a liquid is 90°. If the capillary tube is dipped vertically in the liquid, then the liquid

(A) Will rise in the tube (B) Will get depressed in the tube (C) Will rise up to 10 cm in the tube and will over flow (D) Will neither rise nor fall in the tub

21 When there are no external forces, the shape of a liquid drop is determined by

(A) Surface tension of the liquid (B) Density of liquid (C) Viscosity of liquid (D) Temperature of air only

22 Choose the wrong statement from the following.

(A) Small droplets of a liquid are spherical due to surface tension
(B) Oil rises through the wick due to capillarity
(C) In drinking the cold drinks through a straw, we use the phenomenon of capillarity
(D) Gum is used to stick two surfaces. In this process we use the property of Adhesion

23 If the surface of a liquid is plane, then the angle of contact of the liquid with the walls of container is

(A) Acute angle
(B) Obtuse angle
(C) 90°
(D) 0°

24 K. E. per unit volume of liquid flow is given as

(A) (1/σv2)
(B) pV2
(C) 1/4mV2
(D) 1/2 v2.

25 when mechanical pressure is applied at the opposite faces of Piezo electric crystal then

(A) electric potential difference is produced at the same faces of it.
(B) electric potential difference is produced at perpendicular faces of it
(C) magnetic field is produced at same faces of it
(D) magnetic field is produced at opposite faces of it.

26 In magnetostriction method waves produced in bar are

(A) stationary waves
(B) electromagnetic waves
(C) longitudinal waves
(D) transverse waves.

27 For very high frequency Ultrasonic generation following method is used.

(A) Magneto-striction method
(B) Bernoulli's method
(C) Jaeger’s method
(D) Piezoelectric method.

28 SONAR is the abbreviation of

(A) small navigation and random
(B) sky navigation and ranging
(C) sun nuclear ranging
(D) sound navigation and ranging

29 Ultrasonic waves carry more

(A) energy only
(B) frequency only
(C) heat
(D) energy and frequency

30 Velocity of sound in air.....

(A) 300 m/s
(B) 330 m/s
(C) 1130 m/s
(D) 344 m/s