Total No. of printed pages = 9

END SEMESTER EXAMINATION–2022

Semester : 1st

Branch : Common

Subject Code : SC-104

PHYSICS

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instruction :

All questions of PART–A and Part – B are compulsory.

PART–A

Marks–25

1 Fill in the blanks : 1×10=10

(i) The dimensional formula of Gravitational constant (G) is ——.

(ii) The significant figure of the measured length of 0.0560 is ——.

[Turn over

(iii) When a body starts from rest, then its final velocity is equal to the product of —— with time.

(iv) Work is a —— quantity.

(v) In case of simple pendulum the acceleration is proportional to ——.

(vi) Gravity is the special case of ——.

(vii) S I unit of atmospheric pressure is ——.

(viii) Actual vapor pressure at a certain temperature is equal to saturated vapor pressure at a certain lower temperature. This lower temperature is known as ——.

(ix) The amount of mechanical work done to completely melt one gram of ice is ——.

(x) The velocity of sound in moist air is —— than that in dry air.

2. Choose the correct answers : $1 \times 10 = 10$

(a) Which of the following is not a fundamental unit ?

(i) hertz (ii) kelvin

(iii) ampere (iv) meter

(b) When a body moves on a circular path, the direction of velocity changes and motion is accelerated. Name the physical quantity which remains constant while moving along a circular path.

(i) kinetic energy

(ii) torque

(iii) moment of inertia

(iv) centripetal acceleration

(c) Two wires A and B are of the same length. The diameters are in the ratio 1:2 and the Young's modulus is in the ratio 2:1. If they are pulled by the same force then their elongation will be in the ratio

(i) 1:2 (ii) 2:1

(iii) 4:1 (iv) 1:4

(d) Pressure at any point inside a liquid is

(i) directly proportional to density

(ii) inversely proportional to density

(iii) directly proportional to volume

(iv) inversely proportional to the temperature

(e) In a pressure cooker the vegetables can be cooked in a lesser time because water in the cooker is at a temperature

(i) less than 100°C

(ii) equal to 100°C

(iii) greater than 100°C

(iv) None of the above

(f) A thermometer when put in a water bath of 27°C reads 300. The scale of thermometer is

(i) Reaumur (ii) Fahrenheit

(iii) Kelvin (iv) Faulty thermometer

(g) When the listener approaches the source of sound, the pitch of sound

(i) increases

(ii) decreases

(iii) remains the same

(iv) varies with external factors

(h) When water is heated from 0°C to 100°C, it's volume

(i) increases

(ii) first increases then decreases

(iii) decreases

(iv) first decreases then increases

(i) In a hydraulic press, the piston of pump as compared to press plungers

(i) should have same radius

(ii) should have smaller radius

(iii) should have larger radius

(iv) may be equal or smaller

(j) Application of elasticity includes

(i) Selection of material for high pressure tools

(ii) Strength of ropes

(iii) Safety of bridges

(iv) All of the above

3 Write true or false : 1×5=5

(i) The atmospheric pressure acts not only the earth surface but over the surface of all objects including human on the earth.

(ii) Young's modulus is the ratio between lateral strain and longitudinal strain.

(iii) Universal law of gravitation was able to explain successfully the motion of the moon around the earth.

(iv) The specific gravity of a body indicates how many times the body is heavier than an equal volume of water.

(v) Zero error is a permissible error.

PART – B

Marks – 45

4. (a) Define unit. Write the supplementary SI units. 1+1=2

(b) What is an error ? How can random error be minimized ? 1+1=2

(c) (i) Define scalar and vector products of two vectors, give example. 2+1=3

(ii) Two bodies of masses m_1 and m_2 have the same linear momentum. What is the ratio of their kinetic energy ? 2

Or

State Newton's Second law of motion. Define force from this law.

5. (a) Why are curved roads banked ? A fly wheel of mass 500kg and one meter of radius makes 500 revolutions per minutes. Assuming the mass to be concentrated along the rim, calculate the angular velocity and kinetic energy of the fly wheel. 1+3=4

Or

Define centripetal and centrifugal force with applications.

(b) (i) A body travelling with a velocity of 100m/s accelerates uniformly at the rate of 10 m/sec^2 for a period 30 sec. Calculate the velocity and the distance travelled in 30sec.

(ii) Define moment of inertia. 4+1=5

6. (a) (i) State Hook's law.

(ii) The Young's' modulus for steel is much more than that for rubber. For the same longitudinal strain which one will have greater tensile strength ?

(iii) Why can a steel wire, having greater diameter, support more weight ? 1+1+2=4

(b) (i) As the altitude increases, how does the weight of the body vary ?

(ii) What is the source of centripetal force that a planet required to revolve around the sun ? On what factor does that force depend ? 1+2=3

(c) Find an expression of atmospheric pressure at any point on earth. 2

Or

What are the conditions for working of a siphon ?

7 (a) (i) State Pascal's law. How can the principle of multiplication of force are obtained from this law ?

(ii) Calculate the pressure at a depth of 100m of water in CGS unit. 1+2+1=4

(b) (i) Define forced vibration. 1

(ii) "We can have the information of an approaching train much earlier by putting our ear in contact with the rail track". Justify the statement. 1

(iii) State Sabine's law.

Calculate the frequency of a radio wave of wavelength 160m moving with velocity 330 m/s. 1+2=3

8 (a) (i) Define Coefficient of linear expansion.

(ii) Why does the temperature remain constant till the whole of the solid has melted. 1+1=2

(b) (i) State Joules law of heating and hence define mechanical equivalent of heat.

(ii) Why are handles of cooking utensils not made of metallic substances ? 2+2=4

(c) (i) Define Calorie.

(ii) 90 gm of mercury at 100°C is mixed with 100 gm of water at 20°C. If the resulting temperature is 22°C, what is specific heat capacity of mercury ? 1+2=3

Or

(i) Define heat.

(ii) The volume of a metallic ball is 100c.c at 0°C and 100.85c.c at 100°C. Calculate the coefficient of linear expansion.

~~1+8=9~~
1+2=3