Total No. of printed pages = 8

END SEMESTER/RETEST EXAMINATION – 2019

Semester : 1st (New)

Subject Code : Sc-104

APPLIED PHYSICS – I

Full Marks –70

Time – Three hours

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

Instructions :

1. *All* questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 10×1=10

   (a) Time is the _____ quantity.

   (b) The dimension of work is _____.

   (c) Newton's 1st law of motion gives the _____ of force.

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(d) _____ is the special case of gravitation.

(e) The product of mass and the velocity of a body is called its _____.

(f) The latent heat of fusion of ice is _____.

(g) Echo is due to the _____ of sound.

(h) The practical unit of power is _____.

(i) Sound moves faster in _____ air than dry air.

(j) _____ is the process of change of state from solid to liquid at any temperature.

2. Write true or false of the following statements : 10×1=10

(a) Mass is the measure of inertia of a body.

(b) The direction of centripetal force is acting on the moving body away from the centre of motion.

(c) Displacement is a scalar quantity.

(d) During change of state the temperature of material remains constant.

(e) Heat comes from Sun to earth by conduction process.

(f) Hertz is the unit of wavelength.

(g) Thermometer is a device to measure the heat of a body.

(h) Work is measured by the product of force and the displacement produced.

(i) Sound is elastic wave.

(j) Principle of transmission of pressure inside liquid is given by Boyle's law.

3. Choose the correct answer from the following : 5×1=5

(a) Which one of the following is a vector quantity ?

(i) Momentum

(ii) Work

(iii) Power

(iv) Energy

(b) Water is used in hot water bags because

(i) it has the lowest specific heat

(ii) it has the highest specific heat

(iii) it is not related to specific heat

(iv) None of the above.

(c) The potential energy of wooden ball of mass 1 kg at a height of 1m from the ground ($g = 10\ m/s^2$) will be

(i) 100 Joule (ii) 10 Joule

(iii) 10 Erg (iv) 10 Watt

(d) Velocity of sound in a medium depends on

(i) wind flowing

(ii) density of the medium

(iii) temperature of the medium

(iv) All of the above.

(e) A gap is left between two rails to allow

(i) surface expansion

(ii) linear expansion

(iii) None of the above.

PART – B

Marks – 45

4. (a) What do you mean by errors of measurement ? Explain briefly the various types of errors. 1+2=3

(b) A car starts from rest rolls down with constant acceleration. It travels a distance of 400m in 20 sec. Find the acceleration produced and force acting on it, if its mass of the car is 7000 kg. 3

(c) Show that the mechanical energy of a free falling body under gravity is conserved. 3

5. (a) State and explain Newton's laws of gravitation. Explain why G is called universal gravitational constant ? 3

(b) Define angular velocity. Establish a relation between angular velocity and linear velocity of a body moving on the circumference of a circle of radius 'r'. 1+2=3

(c) Define co-efficient of linear expansion of solid and hence show that $\alpha = \frac{1}{2}\beta$. 3

6. (a) How do you differentiate between heat and temperature of a body ? 3

(b) An iron ball weighing 100 gm and heated to 98.5°C are dropped in a calorimeter weighing 46 gm and containing 85.4 gm of water at 15°C. The final temperature of the mixture becomes 22°C. Calculate the specific heat of iron. (Given, specific heat of calorimeter material = 0.1cal/gm). 3

(c) What is atmospheric pressure ? Find an expression of atmospheric pressure at any point on earth. 1+2=3

7. (a) Define : stress, strain and elastic limit. 3

(b) A wire of length 5 metre and diameter 4 mm is loaded with 80 kg. If the elongation is 1.3 mm, find the Young's modulus of the material of the wire. 3

(c) State Pascal's law of liquid pressure and hence explain the multiplication of force. 1+2=3

8. (a) What are the different modes of heat transfer ? Explain them with examples. 3

(b) Define : specific heat, thermal capacity and water equivalent with their SI units. 3

(c) A body of mass 0.1 kg rotating in a circular path of radius '1' meter with an angular velocity 60 rev. per minute. Find the centripetal force. 3

9. (a) Define moment of inertia, torque and angular momentum. 3

(b) Distinguish between a scalar quantity and a vector quantity. Is displacement a vector quantity ? 3

(c) Calculate the velocity of sound at NTP. Given, normal pressure is 1.013×10^5 N/m^2, density of air is 1.29 kg/m^3 and $\gamma = 1.41$. 3

10. (a) Distinguish between longitudinal wave and transverse wave. 3

(b) Deduce a relation between wave velocity, frequency and wavelength of a wave. 3

(c) Discuss the effect of pressure, density and temperature on velocity of sound in a medium. 3