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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 :
- (a) Mass is the measure of inertia of a body. $10 \times 1 = 10$
- (b) The direction of centripetal force is acting on the moving body away from the centre of motion.
- (c) Displacement is a scalar quantity.

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- (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 : $5 \times 1 = 5$
- (a) Which one of the following is a vector quantity?
- (i) Momentum
- (ii) Work
- (iii) Power
- (iv) Energy

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(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 ($g = 10 \text{ m/s}^2$) 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 = 0.1 cal/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

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(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

(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 $1.013 \times 10^5 \text{ N/m}^2$, density of air is 1.29 kg/m^3 and $\gamma = 1.41$.
3

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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

