

Total No. of printed pages = 7

Sc-104/App.Phy-I/1st Sem/2017/back/N

APPLIED PHYSICS - I

Full Marks - 70

Time - Three hours

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

PART - A

Marks - 25

All questions are compulsory.

1. Fill in the blanks :

1×9=9

(a) $M^1L^2T^{-2}$ represents physical quantities which is _____.

(b) The S.I unit of power is _____.

(c) Weight is a _____ quantity.

(d) The value of acceleration due to gravity is _____ at the equator.

(e) The melting point of ice is _____ °K.

[Turn over

(f) The velocity of sound in moist air is _____ than in dry air.

(g) In SHM acceleration is _____ proportional to displacement.

(h) _____ of sound wave apparently changes due to Doppler effect.

(i) 1 kg wt = _____ Newton.

2. Choose the correct answer : 1×9=9

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

- | | |
|------------|------------|
| (a) gm wt | (b) ampere |
| (c) Kelvin | (d) second |

(ii) Two forces of equal magnitude act at right angles to each other. The angle of the resultant with each of them is

- | | |
|----------------|----------------|
| (a) 90° | (b) 45° |
| (c) 60° | (d) 30° |

- (iii) The temperature of a body is 17°C . What is the temperature of the body in Kelvin scale ?
- (a) 300 K (b) 217 K
(c) 290 K (d) 390 K
- (iv) Which of the following is a vector quantity ?
- (a) work (b) time
(c) momentum (d) volume
- (v) The S.I unit of stress is
- (a) Newton (b) N/m^2
(c) Nm^2 (d) N/s
- (vi) The scale of temperature which is the most sensitive is
- (a) Centigrade (b) Kelvin
(c) Fahrenheit (d) Reaumur
- (vii) Water is used in hot water bags because
- (a) It has the lowest specific heat
(b) It has the highest specific heat
(c) It is not related to specific heat
(d) It has the highest thermal capacity

(viii) With the increase of pressure, the velocity of sound

- (a) Increases
- (b) Decreases
- (c) Remain unchanged
- (d) First increases and then decreases

(ix) Pitch of a sound depends on its

- (a) velocity
- (b) wavelength
- (c) frequency
- (d) time period.

3. State whether the following statements are true or false :

$$1 \times 7 = 7$$

- (i) Joule is the S.I unit of energy
- (ii) Weight of a body is maximum at the poles
- (iii) Young's modulus has the unit same as that of force
- (iv) Siphon is a device used to transfer liquid from a high level to a low level
- (v) Water equivalent of a body is measured in calorie

(vi) Velocity of sound increases with the increase in pressure

(vii) Heat is a scalar quantity.

PART - B

Marks - 45

Answer any five questions.

1. (a) Write the supplementary quantities with their S.I units. 2
- (b) Define scalar and vector quantities with examples. 2
- (c) A car attains a velocity of 30 ms^{-1} in 3 minutes from rest. Calculate its acceleration. 3
- (d) Differentiate between mass and weight. 2

2. (a) State Newton's first law of motion and hence define force. 2
- (b) What do you mean by impulse? State its unit. 2
- (c) Calculate the potential energy of a body of mass 50 gms placed at a height of 10 metres from the ground. (Take $g = 9.8 \text{ ms}^{-1}$) 3

- (d) Define centripetal force and give an example of a centrifuge. 2
3. (a) Define work, power, energy and state their S.I units. 3
- (b) What do you mean by a second's pendulum? 1
- (c) Deduce the relationship between the angular and linear velocity. 2
- (d) Find the mass of the earth given that the radius of the earth is $6.4 \times 10^6 \text{ m}$ and $G = 6.67 \times 10^{-11}$ S.I units. 3
4. (a) Determine the force required to double the length of a steel wire of cross sectional area 0.5 cm^2 . The Young's modulus for steel is $2 \times 10^{11} \text{ Nm}^{-2}$. 3
- (b) State Pascal's law for transmission of liquid pressure. Hence define multiplication of forces. $1+2=3$
- (c) The specific gravity of a body is 1.5. Express its density in S.I unit. 2
- (d) How is atmospheric pressure measured? 1

5. (a) Calculate the temperature at which the reading on the Centigrade scale and Fahrenheit scale is the same. 3
- (b) Explain anomalous expansion of water. 2
- (c) Define specific heat and water equivalent. 2
- (d) 15 gms of water at 20°C is mixed with 150 gms of water at 100°C . Calculate the final temperature of the mixture. 2
6. (a) What do you understand by the statement "latent heat of vaporization of water is $540 \text{ cal/gm}^{\circ}$ " ? 2
- (b) What is longitudinal wave ? Explain with examples. $1+1=2$
- (c) Calculate the frequency of a note of sound in air moving with velocity 330 ms^{-1} and wavelength 180 cm. 2
- (d) State Newton's formula for velocity of sound in air. How did Laplace correct it ? 3