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END SEMESTER EXAMINATION, NOVEMBER-2018

Semester : 1st (odd) New syllabus

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* the questions of PART-A are compulsory.
2. Answer *any five* questions from PART-B.

PART – A

Marks – 25

1. Fill in the blanks with appropriate words :

1×10=10

- (a) The dimensional formula for moment of inertia is _____ .
- (b) The number of significant figure in 6.0037 is _____ .

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- (c) Weight is _____ quantity.
- ✓(d) The SI unit of angular momentum is _____.
- ✓(e) Newton-sec is the unit of _____.
- (f) The value of acceleration due to gravity at the centre of the earth is _____.
- ✓(g) A substance has specific gravity 4. Its density in SI is _____.
- ✓(h) The quantity of heat required to raise the temperature of 5 kg of water through 20°C is _____ calorie.
- ✓(i) The product of frequency and time period is equal to _____.
- ✓(j) Velocity of sound is _____ of pressure.

2. Choose the correct answer from each of the following : $1 \times 5 = 5$

(a) The physical quantity which has same dimension of momentum is

- | | |
|--------------|-----------------------|
| (i) force | (ii) impulse |
| (iii) torque | (iv) angular momentum |

(b) Which of the two vectors are equal ?

(i) Vectors having equal magnitudes only.

(ii) Vectors having same direction only.

✓ (iii) Vectors having same magnitude and direction.

(iv) None of the above.

(c) All the points of a rigid body rotating about a given axis have the same

(i) linear velocity

✓ (ii) angular velocity

(iii) angular acceleration

(iv) None of the above

(d) A body weigh 110 gm. in air and 100 gm. in water of density 1 gm/cm^3 . The density of the body in gm/cm^3 is

✓ (i) 1.1

✓ (ii) 11

(iii) 5.5

(iv) 0.91

(e) A man has a frequency of 400 while that of a woman's is 200 ; their wavelengths are in the ratio.

(i) 1 : 4

(ii) 1 : 2

✓ (iii) 2 : 1

(iv) 4 : 1

3. Write true or false :

$$1 \times 10 = 10$$

(a) Absolute error is the difference between the true value and the measured value. ✓

(b) The temperature at which the Celsius and Fahrenheit scale read the same is $+ 40^\circ$.

(c) Rubber is more elastic than steel. ✓

✓ (d) At dew point the actual vapour pressure becomes the saturated vapour pressure.

✓ (e) Intensity of sound at any point is directly proportional to the square of amplitude.

(f) A particle in SHM while passing through the mean position will have both potential and kinetic energy. ✓

(g) Siphon does not work in vacuum.

(h) Orbital velocity of a satellite is the maximum velocity required to put the satellite into a given orbit around the earth.

(i) Centripetal and centrifugal forces are action and reaction.

(j) Coefficient of linear expansion depends on unit of length.

PART – B

Marks – 45

✓ 4. (a) What is unit? Write the supplementary unit in SI. 1+1=2

(b) What do you mean by absolute error and relative error? 2

(c) Two forces of 60N and 40 N are inclined to each other at an angle of 60° . Find the magnitude and direction of their resultant. 3

(d) State Newton's 1st law of motion. From this law define force. 2

✓ 5. (a) State the law of Conservation of momentum. 1

(b) A body of mass 50 kg is at rest. If it is acted upon by a force of 20 N for 4 sec., how much speed will it acquire? 2

(c) Derive a relation between angular velocity and linear velocity. 2

(d) Why banking of track is required? A car is racing on a circular track of 180m radius and banking angle 30° . To avoid the chances of skidding what should be the speed of the car? 1+3=4

✓ 6. (a) Define moment of inertia and torque. 2

(b) A bullet having a mass of 50 gm is moving with a velocity of 1000 m/sec. Find its kinetic energy. 1

(c) A wire of length 1 m is stretched by a force of 10 N. The area of cross-section of the wire is $2 \times 10^{-6} \text{ m}^2$ and Y is $2 \times 10^{11} \text{ N/m}^2$. Calculate (i) stress (ii) strain and (iii) the increase in length of the wire. 1+1+1=3

(d) State Newton's law of gravitation. Hence define gravitational constant. 2+1=3

7. (a) Write two differences between thrust and pressure. 2

- (b) The diameters of a hydraulic press are 4 cm and 40 cm respectively. The arms of the lever are in the ratio 6 : 1. Find the total force produced on the larger piston when a force of 75 kg is applied at the end of larger arm of the lever. 3
- (c) 40 gm of water at 60°C are poured into a calorimeter whose temperature is 20°C . The final temperature of the two is 45°C . Find the water equivalent of the calorimeter. 2
- (d) Distinguish between evaporation and boiling. 2
8. (a) Distinguish between transverse wave and longitudinal wave. 2
- (b) Deduce a relation between wavelength, frequency and velocity of wave. 2
- (c) Calculate the increase in velocity of sound for 1°C rise in temperature if velocity of sound is 332 m/s at 0°C . 2
- (d) Define the three characteristics of musical sound. 3

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9. (a) Define co-efficient of linear expansion. Does it depend on unit of length and unit of temperature ? 1+2=3
- (b) Define different modes of transmission of heat. 3
- (c) What is anomalous expansion of water ? 1
- (d) What is echo and reverberation ? 2



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