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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 :

$1 \times 10 = 10$.

(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:
- (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 weighs 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 60 N 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

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(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