BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – Dip.CSE-2022/Dip.ME-2022/Dip.RA-2022/Dip.EE-2022/Dip.CE-2022/Dip.RA-2023/Dip.CE-2023/Dip.CSE-2023/Dip.EE-2023/Dip.ME-2023

Course Name – Applied Physics

Course Code - BS201

(Semester II)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Choose the quantity whose dimensional formula is $[ML^{-1}T^{-2}]$.

a) Force b) Coefficient of friction
c) Modulus of rigidity d) Energy

(ii) A particle is thrown vertically upward with a velocity 40 ms^{-1} from the ground. Calculate the time after which it will reach the ground.

a) 8 s b) 20 s
c) 16 s d) 4 s

(iii) Displacement is a _____.

a) scalar quantity b) vector quantity
c) derived quantity d) none of these

(iv) A heavy truck has more momentum than a passenger car moving at the same speed because the truck _____.

a) has greater mass b) has greater speed
c) is not streamlined d) has a large wheelbase

(v) For a free-falling body, identify the conserved quantity among the following options.

a) Kinetic energy only b) Sum of kinetic and potential energy
c) Potential energy only d) Electrical energy

(vi) 1 Horse Power (HP) when converted to the unit watt, gives value _____.

a) 446 b) 766
c) 746 d) 674

(vii) A body is said to be perfectly plastic if _____.

a) it does not recover its original shape / size when the deforming force is removed b) it expands without breaking, on subjection of large strain

c) it has the property of stretching indefinitely
d) it is not effected by external force

(viii) The surface of water in contact with glass wall is _____.
a) plane
b) concave
c) convex
d) both 'b' and 'c'

(ix) According to Archimedes' principle, if a body is immersed partially or fully in a fluid then the buoyancy force is _____.
a) equal to the weight of fluid displaced by the body
b) less than the weight of fluid displaced by the body
c) more than the weight of fluid displaced by the body
d) unpredictable

(x) Identify the hearing range of human ear.
a) 20 Hz to 20,000 Hz
b) less than 20 Hz
c) more than 20,000 Hz
d) 20 Hz to 25,000 Hz

(xi) The bending of a beam of light when it passes obliquely from one medium to another is known as _____.
a) reflection
b) refraction
c) dispersion
d) deviation

(xii) Identify the formula related to a lens.
a) $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
b) $\frac{1}{f} = \frac{1}{u} - \frac{1}{v}$
c) $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$
d) $f = \frac{1}{u} + \frac{1}{v}$

(xiii) A pentavalent impurity has _____ valence electrons.
a) 2
b) 3
c) 4
d) 5

(xiv) A semiconductor in its purest form is called _____.
a) insulator
b) superconductor
c) intrinsic semiconductor
d) extrinsic semiconductor

(xv) In case of photoelectric effect, light shows _____ nature.
a) wave
b) particle
c) wave-particle dual
d) none of these

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Write short note on (i) angular velocity and (ii) torque. (3)

3. Define energy and power. Write their dimensions. (3)

4. One student is using a lens of focal length 50 cm and another one is using the same but of focal length –50 cm. Determine the nature of the lens and its power used by each of them. (3)

5. State Pascal's law for transmission of fluid pressure. Is the principle of conservation of energy obeyed in this law? (3)

6. Describe whether a sound wave of time period 0.04 sec will be audible or not. (3)

OR

Compare thermionic emission and photoemission? (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Starting from the formula of work done on a body, show that the kinetic energy of the body is equal to $\frac{1}{2} mv^2$. (5)

8. A capillary tube of radius 0.25 mm is dipped in water of surface tension 75×10^{-3} N.m^{-1}. Evaluate the rise of water in the tube. [Given: angle of contact = 0^0 and $g = 10$ m.s^{-2}.] (5)

9. A running bullet penetrating 6 cm through a wooden block, its velocity reduced to half of its initial velocity. How far will it penetrate further before it stops? (5)

10. Briefly discuss the processes spontaneous emission and stimulated emission in LASER. (5)

11. Distinguish metal, semiconductor and insulator in terms of their energy band diagrams. (5)

12. Estimate the luminous flux incident on a surface of area 10 cm^2 at a distance of 1 m from a lamp of illuminating power 10 cd? (5)

OR

Calculate work function in electron volt for sodium metal. Given threshold wavelength of sodium is 663 nm, Planck's constant is 6.625×10^{-34} Js, 1eV is 1.602×10^{-19} J and velocity of light in vacuum is 3×10^8 m/sec. (5)

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