



BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – Diploma in Electronics & Communication Engineering/ Diploma in Electrical Engineering/ Diploma in Computer Science & Engineering

Course Name - Physics I

Course Code – DPHY010101

(Semester – 1)

Time allotted: 3 Hours

Full Marks: 70

[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)

10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) The refractive index of a medium depends on

- | | |
|-------------------------------------|------------------------------------|
| a. the angle of incidence | b. the angle refraction |
| c. the wavelength of the light used | d. the intensity of the light used |

(ii) Surface tension is basically

- | | |
|---------------------------|-------------------------|
| a. energy \times length | b. energy \times area |
| c. energy / length | d. energy / area |

(iii) The SI unit of stress is

- | | |
|---------------------|------------------------------|
| a. N | b. Nm^2 |
| c. Nm^{-2} | d. N^{-1}m^2 |

(iv) Bulk modulus is the property of

- | | |
|----------------------|------------------------------|
| a. solids only | b. solids and liquids |
| c. liquids and gases | d. solids, liquids and gases |

- (v) The rise of liquid in a capillary tube is directly proportional to
- | | |
|--------------------------------------|------------------------------------|
| a. the radius of tube | b. the density of liquid |
| c. the surface tension of the liquid | d. the acceleration due to gravity |
- (vi) Power of a convex lens of focal length 20 cm is
- | | |
|--------|---------|
| a. 5 W | b. 5D |
| c. 5 J | d. 0.2m |
- (vii) Bar is the unit of
- | | |
|-------------|------------------|
| a. pressure | b. thrust |
| c. energy | d. none of these |
- (viii) The SI unit of luminous flux is
- | | |
|----------|------------------|
| a. lumen | b. candela |
| c. lux | d. none of these |
- (ix) A gas undergoing isothermal process obeys
- | | |
|-----------------|------------------|
| a. Boyle's law | b. Charles' law |
| c. Pressure law | d. none of these |
- (x) Corresponding to which of the following colours the refractive index of a medium is maximum?
- | | |
|-----------|-----------|
| a. Red | b. Violet |
| c. Yellow | d. Green |

Group – B

(Short Answer Type Questions)

3 x 5 = 15

Answer any *three* from the following

2. In an experiment of simple pendulum, a student made several observations for the period of oscillation. His readings turned out to be 2.63 s, 2.56 s, 2.42 s, 2.71 s and 2.80 s. Find (i) mean period of the oscillation (ii) absolute error in each reading, (iii) mean absolute error, (iv) fractional error and (v) percentage error.

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3. State the laws of refraction. The refractive index of diamond is 2.42. What is the meaning of this statement in relation to speed of light? 3+2
4. Define photoelectric effect. Write down Einstein photoelectric equation and interpret the terms. Calculate the maximum kinetic energy of an electron ejected from silver by a 3.13×10^{15} Hz photon. The work function of silver = 4.73 eV and $h = 4.14 \times 10^{-15}$ eVs. 1+4
5. An equiconvex lens of focal length f is cut along its diameter into two equal halves. Find the focal length of each half. 5
6. (a) What is isothermal process? Draw pressure (P) - volume(V) isothermal graphs.
- (b) Calculate the quantity of heat conducted through 2m^2 of a brick wall 12cm thick in an hour if the temperature on one side is 8°C and that on the other side is 28°C . 1+1+3

Group – C

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

7. (a) State the principle of photometry. 2
- (b) A lamp of illumination power 100 cd is hanging vertically at a height of 4 m above the centre of a circular table of radius 3 m. Calculate the luminance at the centre and the edge of the table. 5
- (c) An object of height 5 cm stands erect in front of a convex lens. An image of height 25 cm is formed on a screen placed at a distance of 100 cm from the lens. Determine the focal length of the lens. 4
- (d) What do you mean by monochromatic source? Write down the conditions of coherence of two sources. 1+3
8. (a) State Archimedes' principle. Determine the volume of a solid of any shape by Archimedes' principle. 2+4
- (b) The power of a lens is -4D . What is its focal length? What type of lens is it? 2+2
- (c) On what factors does surface tension of a fluid depend? 3
- (d) The Young's modulus of steel is $2.0 \times 10^{11} \text{ N/m}^2$. What is meant by this statement? 2

9. (a) Define Poisson's ratio. What are the minimum and maximum values? Can it be regarded as an elastic modulus? How are Y , K and σ related? 1+1+1+2
- (b) A steel wire of length 4.7 m and cross-section $3.0 \times 10^{-5} \text{ m}^2$ stretches by the same amount as a copper wire of length 3.5 m and cross-section $4.0 \times 10^{-5} \text{ m}^2$ under a given load. What is the ratio of the Young's modulus of steel to that of copper? 5
- (c) Establish a relation among time period (T), gravitational acceleration (g) and length (l) of a simple pendulum. 5
10. (a) State the first law of thermodynamics. Which conservation principle does this law denote? 2+1
- (b) Deduce the relation among the coefficient of linear expansion, coefficient of superficial expansion and coefficient of cubical expansion of a solid. 9
- (c) Pendulum clock goes slow in summer and fast in winter. Explain. 3
11. (a) State Huygen's principle of propagation of wavefront. What is the shape of wavefront (i) for a point source of light, (ii) for a long line source of light and (iii) when the source is at a very large distance away? 2+3
- (b) Define work function. How the photoelectric current changes with the increasing intensity of the incident beam? Name one metal that is suitable for photoelectric effect. Draw the block diagram for the experimental set up of the photoelectric current. 1+1+1+2
- (c) When a light of wavelength 5000 \AA is incident on a metal surface, maximum kinetic energy of emitted photoelectron is found to be 0.3 eV. Express work function of the metal in eV. ($h = 6.64 \times 10^{-27} \text{ erg. s}$) 5
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