



16602

**BRAINWARE UNIVERSITY**

Term End Examination 2025-2026

Programme – B.Tech.(BT)-2024/B.Tech.(BT)-2025

Course Name – Applied Physics

Course Code - BBS00004

(Semester I)

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

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) Which one of the following pair has the same dimensions?
- a) Specific heat and latent heat b) Impulse and momentum
c) Surface tension and force d) Moment of inertia and torque
- (ii) A particle is thrown vertically upward with a velocity 40 ms^{-1} from the ground. The particle will reach the ground after _____.
- a) 8 s b) 20 s
c) 16 s d) 4 s
- (iii) Magnitude of displacement from initial position to final position is the _____.
- a) straight line b) curved line
c) circle d) none of these
- (iv) In p-type semiconductors, hole concentration is _____ electron concentration.
- a) equal to b) greater than
c) less than d) half of
- (v) When work is done on a body, the body _____.
- a) loses energy b) experiences no change in the energy
c) gains energy d) first loses then gains energy
- (vi) For a free-falling body, the conserved quantity is _____.
- a) kinetic energy only b) sum of kinetic and potential energy
c) potential energy only d) electrical energy
- (vii) The principle which is responsible for the propagation of light in an optical fiber is _____.
- a) scattering b) refraction
c) total internal reflection d) successive reflection
- (viii) Strain has _____.
- a) no unit but only dimension b) only unit but no dimension

- c) no unit, no dimension but a constant value
d) no unit, no dimension but a variable value
- (ix) The rise of liquid in a capillary tube depends on _____.
a) the radius of the tube
b) the density of the liquid
c) the surface tension of the liquid
d) the acceleration due to gravity
- (x) The SI unit of viscosity is _____.
a) candella
b) unitless
c) N/m
d) poise
- (xi) Coherent sources are those which _____.
a) have different frequencies
b) have constant phase difference and same frequency
c) emit light of different colors
d) are not synchronized
- (xii) Fresnel diffraction occurs when _____.
a) source and screen is at finite distance from the diffracting aperture
b) source and screen are at infinite distances
c) light passes through a prism
d) light is polarized
- (xiii) The power of lens of focal length 1 cm is _____.
a) 1 D
b) 100 D
c) 10 D
d) 0.01 D
- (xiv) In simple harmonic motion, the acceleration of the particle is _____.
a) constant
b) zero
c) directly proportional to the displacement
d) directly proportional to the opposite to the displacement
- (xv) The work function in connection to the photoelectric effect is _____.
a) the minimum energy required to remove electron from the metal surface
b) the photon energy
c) the minimum electric potential that causes the photocurrent to vanish
d) the kinetic energy of the most energetic electron ejected

Group-B

(Short Answer Type Questions)

3 x 5=15

2. A constant retarding force of 50 N is applied to a body of mass 20 kg moving initially with a speed of 15 m/s. How long does the body take to stop? (3)
3. Write the expression for Young's modulus of a material. When a weight of 10 kg is suspended from a copper wire of length 3 m and diameter 0.4 mm, its length increases by 2.4 cm. If the diameter of the wire is doubled, then what will be the extension in its length. (3)
4. State the law of conservation of mechanical energy. A 2 kg object is dropped from a height of 10 m. Calculate its speed just before hitting the ground. (3)
5. Distinguish between n-type and p-type semiconductor. (3)
6. Write down the lens formula. A concave lens of focal length 20 cm produces an image half of the size of the real object. Find the distance of the real object from the lens. (3)

OR

Write down the expression for the fringe width in Young's double-slit experiment. In (3)
Young's double-slit experiment, monochromatic light of wavelength 600nm is used.
The distance between the slits is 0.2mm, and the screen is placed 2m away from the
slits. Estimate the fringe width.

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Group-C

(Long Answer Type Questions)

5 x 6=30

7. Define power. What is the SI unit of power? What do you mean by 1 horsepower? A (5)
pump raises 1000 kg of water through a vertical height of 10 m in 20 seconds.
Calculate the work done. Calculate the power developed by the pump.
8. What is the relationship between displacement and acceleration of a Simple Harmonic (5)
Motion (SHM) ? How the phases of these quantities are related ? A spring with a
spring constant, $k = 80 \text{ N/m}$ is attached to a 1 kg mass. The mass is displaced by 5 cm
from its equilibrium position. Calculate the angular frequency and the time period of
the motion.
9. Define Young's modulus. For a wire of length L , maximum change in length under (5)
stress condition is 2 mm. What is the change in length under same conditions when
length of wire is halved?
10. Evaluate the numerical aperture, acceptance angle and critical angle of a fiber having (5)
core and cladding refractive indices 1.5 and 1.45 respectively.
11. Explain how the law of conservation of momentum can be used in recoil of a gun. (5)
12. Newton's rings are formed by light reflected normally from a plano-convex lens and a (5)
plane glass plate with a liquid between them. The diameter of n th and $(n + 10)$ th bright
rings are 2.18 mm and 4.51 mm respectively. Calculate the refractive index of the
liquid. Radius of curvature of the lens is 90 cm and wavelength of light employed is
589.3 nm.

OR

Define power of a lens. What is its unit? What does a positive or negative power (5)
indicate ? Calculate the power of a convex lens of focal length 25 cm. If this lens is
combined with a concave lens of power -5 D , find the equivalent power of the
combination.
