



Seat No. _____

HS-003-1012002

B. Sc. (Sem. II) (CBCS) Examination

May - 2023

Physics : Paper - 201

(Wave Optics Semiconductor) (Old Course) (2016)

Faculty Code : 003

Subject Code : 1012602

Time : $2\frac{1}{2}$ / Total Marks : 70

- 1 (a) Objective type questions: 4
- (1) Longitudinal wave and produced in liquids (True/false)
 - (2) Sound Wave are longitudinal wave (True/False)
 - (3) Write the types of wave motion.
 - (4) Amplitude at node points is _____ (zero, one)
- (b) Solve any one : 2
- (1) Find the velocity of transverse wave travelling along a string having linear mass density 1.6×10^{-3} g/c.m. and tension 85 dyne.
 - (2) Find the velocity of sound in water having volume elasticity 196×10^8 dyne/cm² and density 1 g/cm³.
- (c) Answer any one : 3
- (1) A wire 60 cm. long and of linear mass density 12×10^{-3} kg/m is stretched so that it makes 70 vibrations per second. Find the stretching force in the string.
 - (2) Explain Beat in detail.
- (d) Answer any one in detail : 5
- (1) Write a note on Doppler effect.
 - (2) Explain the formation of standing wave.

- 2 (a) Objective type questions : 4
- (1) Zener diode is always connected in _____ biased.
(Reversed, Forward)
 - (2) Four diodes are used in _____ reaction.
(Bridge, Half wave, centre-tap)
 - (3) Draw the symbol of P-N junction diode.
 - (4) How many terminals are there in transistor ?
- (b) Solve any one : 2
- (1) A crystal diode having internal resistance $r_f = 25 \Omega$ is used for the half wave rectification. If the applied voltage $V = 70 \sin \omega t$ and load resistance $R_L = 500 \Omega$ then find I_m .
 - (2) In a common base connection the current amplification factor is 0.60. If the emitter current is 1 M.A. determine the value of base current.
- (c) Answer any one : 3
- (1) In a common base connection the value of emitter current is 1 m.A and base current is 0.2 m.a. find the value of amplification factor.
 - (2) Describe the working of full wave bridge rectifier.
- (d) Answer any one in detail : 5
- (1) Write a note on Zener diode.
 - (2) Explain structure and working of transistor.
- 3 (a) Objective type questions : 4
- (1) For constructive interference path difference $d \sin \theta = n\lambda$
(true/false)
 - (2) Soap bubble looks coloured due to _____
(interference/diffraction)
 - (3) The velocity of light is maximum in vacuum (True/false)
 - (4) The center region in Newton's lung is dark. (True/False)

- (b) Solve any one ; 2
- (1) Distance between two slits is 0.01 cm and the width of the fringes formed on the screen is 0.6 cm, if the distance between the screen and the slit is 100 cm,. Calculate the wavelength of light used.
 - (2) Distance between two slits is 0.1 mm and the distance between the screen and the slit is 1m, the wavelength of light used is 4500 \AA then find the width of the fringes formed on the screen.
- (c) Answer any one : 3
- (1) The fringes of equal thickness are formed when two glass plate are kept over each other with a small gap in between. If a parallel beam of light of wavelength 6500 \AA is used and fringe separation is 2.5 mm what is the angle between the plate?
 - (2) Explain Lloyd's mirror.
- (d) Answer only one in detail ; 5
- (1) Write a note on : Newton's lung
 - (2) Discuss interference produced by reflected light.
- 4 (a) Objective type questions : 4
- (1) Diffraction will be occurred if the wave is coherent. (True/False)
 - (2) The area of each half period zone is equal to $\pi b\lambda$. (True/false)
 - (3) What is interference ?
 - (4) Give the name of diffraction.
- (b) Solve any one : 2
- (1) What is the radius of the first zone of a zone plate of focal length 40 cm for a light of wavelength 60000 \AA .
 - (2) What is the radius of the second zone of a zone plate of focal length 0.2 m for a light of wave length 6000 \AA .
- (c) Answer any one : 3
- (1) The radius of the first ring of a zone plate is 0.8 mm if the plane wave of wavelength 5000 \AA fall on the plate. Find where a screen should be placed so that light is focused at the brightest spot.

- (2) Difference between prism spectrum and grating spectrum.
- (d) Answer any one in detail : **5**
- (1) Describe zone plate.
- (2) Difference between Fresnel and Fraunhofer diffraction.
- 5** (a) Objective type questions : **4**
- (1) Intensity of light depends on amplifier. (True/False)
- (2) Dispersive power $\omega = \frac{d\mu}{\mu - 1}$. (true/false)
- (3) The unit of dispersive power is W (true/false)
- (4) Angle of deviation is minimum for _____ colour. (Red, violet)
- (b) Solve any one : **2**
- (1) Two polarizing plates have polarizing directions parallel to as of transmit maximum intensity of light. If the angle between the plate be 45° then the calculate the intensity of transmitted beam,
- (2) Two polarizing sheets have their polarizing directions parallel so that the intensity of the transmitted light is a maximum through what angle must either sheet be turned so that the intensity become one half the initial value.
- (c) Answer any one : **3**
- (1) Find the refractive index of the medium, if the angle of polarization is 62° .
- (2) Explain Malus's law in detail.
- (d) Answer any one in detail : **5**
- (1) Discuss Cardinal points.
- (2) Discuss Nicol Prism.
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