Total No. of Questions : 11]

PF-17059

SEAT No. :

[Total No. of Pages : 4

[6624]-502
F.E.
BSC-102-BES : ENGINEERING PHYSICS
(2024 Pattern) (Semester - I/II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Q.1 is compulsory.*
2) *Solve Q2 or Q3, Q4 or Q5, Q6 or Q7, Q8 or Q9, Q10 or Q11.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data, if necessary.*

Q1) Choose and write the corection option.

i) The techniques of producing three dimensional images of an object is called as [1]

a) Holography b) Photography

c) Lithography d) All the above

ii) The propagation of light in an optical fiber is based on the principle of [1]

a) Total Internal Refraction b) Total Internal Reflection

c) Total Internal Redirection d) Through Internal Refraction

iii) The mater waves are associated with _____ [1]

a) Charged and uncharged particles

b) Only charged particles

c) Neither charged nor uncharged particles

d) None of the above

iv) The wave function ψ must be _____ at each and every point in space. [1]

a) Infinite b) Finite

c) Zero d) Infinity

P.T.O.

v) A very thin film in reflected light appears [1]

a) Dark b) Bright

c) White d) Yellow

vi) Which wave cannot be polarized? [1]

a) Transverse wave b) Longitudinal wave

c) Electromagnetic wave d) Matter waves

vii) The Hall effect is used to determine _____ [1]

a) Density and mobility of charge carriers

b) Fermi energy

c) Energy gap (Eg)

d) All the above

viii) The frequency of ultrasonic waves is greater than [1]

a) 20MHz b) 20KHz

c) 20Hz d) 200Hz

ix) SQUIDS are used to measure _____ associated with brain. [1]

a) Magnetic flux b) Power

c) Energy d) Stress

x) The Physical vapor deposition technique is a [1]

a) Top-down approach technique

b) Bottom-up approach technique

c) Neither Top Down nor Bottom Up

d) All the above

Q2) a) With the help of neat labelled diagram explain the construction and working of CO_2 laser. [6]

b) Differentiate between step index and graded index fibres. [3]

c) Calculate the maximum angle of acceptance such that light ray can travel through the fiber. Given: $n_1 = 1.6$ and $n_2 = 1.5$ [3]

OR

Q3) a) What is attenuation in optical fibres? Discuss in brief the various factors responsible for attenuation. [6]

b) Explain characteristics of a laser. [3]

c) With the help of neat labelled diagram explain construction of Hologram. [3]

Q4) a) State and explain de Broglie hypothesis. Derive the equation of de Broglie wavelength in terms of Kinetic energy. [6]

b) An electron is bound by a potential which closely approaches an infinite square well of width 1A°. Calculate the lowest permissible energies (in electron volts) the electron can have. [3]

c) What is the wave function ψ? Explain its physical significance. [3]

OR

Q5) a) Derive Schrodinger's time independent wave equation. [6]

b) What is the De Broglie wavelength of an electron when accelerated through a potential difference of 100 volts? [3]

c) State properties of matter waves. [3]

Q6) a) Explain interference in thin parallel film in the reflected system with a neat & labelled diagram. Calculate the total path difference. Obtain the condition of maximum and minimum. [6]

b) Light of intensity Io is incident on a polarizer. What is the intensity of the resultant beam if incident light is plane polarized with electric field making an angle of 30° with the axis of the polarizer. [3]

c) Differentiate between e-ray and o-ray (any three). [3]

OR

Q7) a) What is double refraction? Explain Huygens' theory of double refraction. [6]

b) Find the angle of wedge in degree for a thin glass wedge of refractive index 1.52 with fringe spacing 0.1 mm and wavelength of light is 5893 A. [3]

c) Derive expression for minimum thickness of the antireflection coating film. [3]

(51)

Q8) a) Derive an expression for Fermi energy level of an intrinsic semiconductor using fermi-Dirac function. **[6]**

b) An ultrasonic pulse of frequency 80 KHz is sent down towards the sea bed. The echo is recorded after 0.7 sec. If the velocity of sound in sea water is 1500 m/s. Calculate the depth of sea. **[3]**

c) What are characteristics of ultrasonic waves. (any three). **[3]**

OR

Q9) a) What is Piezoelectric effect? Explain the construction and working of piezoelectric oscillator to produce the ultrasonic waves. **[6]**

b) The Hall coefficient of a specimen of doped silicon is found to be 3.66×10^{-4} m^3/C. The resistivity of specimen is $1 \times 10^{-2}\Omega$-m. Determine the mobility of charge carriers. **[3]**

c) Draw I-V characteristics of a solar cell showing power curve. Define fill factor. **[3]**

*Q10)*a) Explain optical and electrical properties of nanoparticles. **[6]**

b) Explain the Meissner effect, prove that superconductors exhibit perfect diamagnetism. **[6]**

OR

*Q11)*a) With neat labelled diagram explain the process of nanoparticles using physical vapour deposition technique. State advantages of this technique. **[6]**

b) Distinguish between type-I and type-II superconductors (any six) **[6]**

CEGP020311 103.115.201.226 27/08/2026 13:30:11