QPC: RA19BTECH089 AR 19 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (First Semester) Examinations, April – 2021

BBSBS1021 – Engineering Physics

(Common to All Branches)

Time: 3 hrs Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer *ALL* questions	[CO#]	[PO#]
a. Which of the following waves does not carry energy? (i) Longitudinal waves (ii) Electromagnetic waves (iii) Stationary waves (iv) Transverse waves	CO1	PO1
b. A Laser requires mirrors because (i) They provide optical feedback (ii) they invert the population inversion (iii) they determine the wavelength at which lasing occurs (iv) they provide good look	CO2	PO1
c. A path difference of $\frac{3\lambda}{2}$ between two waves corresponds to a phase difference of : (i) $\frac{3\pi}{2}$ (ii) $\frac{\pi}{3}$ (iii) 3π (iv) $\frac{2\pi}{3}$	CO1	PO2
d. In an FCC structure how much percentage of the volume is not occupied by the atoms. (i) 74% (ii) 26% (iii) 68% (iv) 52%	CO3	PO1
e. Value of susceptibility for Diamagnetic materials is always _____. (i) Positive (ii) Infinity (iii) Negative (iv) Zero	C03	PO1
f. The Curl of a physical quantity highlights its : (i) directional process (ii) derivative process (iii) diverging process (iv) rotational process	C04	PO1
g. Ampere's circuital law is valid for: (i) varying electric field (ii) steady electric field (iii) alternating current only (iv) none of these	C04	PO1
h. $\vec{\nabla}.\vec{B} = 0$, signifies that: (i) B is a conserved field (ii) magnetic monopole does not exist (iii) $\vec{B} = 0$ (iv) there exist a magnetic monopole	C04	PO1
i. The Black body radiation explains about _____ nature of wave: (i) wave (ii) particle (iii) fluid (iv) liquid	CO5	PO1
j. According to Einstein's photoemission theory, an electromagnetic wave consists of a stream of: (i) photo electrons (ii) photons (iii) protons (iv) positrons	C05	PO1

PART – B: (Short Answer Questions) **(2 x 10 = 20 Marks)**

Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. A damped oscillator reduces its amplitude to 1/10 of the original after making 40 number of oscillations. If the time period of the oscillator is 1.5 sec. then find the	C01	PO2

relaxation time of the oscillator.

b.	Find the diameter of the 15^{th} dark ring , if the wavelength of light and the radius of curvature of the Plano convex lens are 6000 A^0 and 100cm. respectively?	C01	PO2
c.	What are the characteristics of a Laser beam?	C02	PO1
d.	In an optical fiber, the core material has refractive index 1.61 and refractive index of the cladding material is 1.32 . What is the value of numerical aperture?	C02	PO2
e.	The spacing between the cubic crystal planes (2 2 L) is 1.85 A^0 where L is unknown Miller index . If the lattice constant is 5.55 A^0?	C03	PO2
f.	The critical temperature T of Hg with an isotopic mass of 199.5 is 4.195K. What will be its critical temperature , when its isotopic mass is increased to 203.4K?	C03	PO2
g.	State Stoke's theorem for a conserved vector and show that the vector is irrotational?	C04	PO2
h.	Differentiate between the conduction current and displacement current?	C04	PO1
i.	Discuss about the characteristics of photo emission ?	C05	PO1
j.	Evaluate the De Broglie wavelength of a electron travels with speed 2 x 10^8 m/s.?	C05	PO2

PART – C: (Long Answer Questions) **(10 x 4 = 40 Marks)**

Answer ***ALL*** questions

		Marks	[CO#]	[PO#]
3. a.	Discuss with a neat diagram that how interference fringes are produced in Newton's Ring Experiment and derive the expression for the diameters of the dark and bright rings?	10	C01	PO1
	(OR)			
b.	Discuss with a schematic diagram about the principle, construction, working and application of a He-Ne Gas laser.	10	C02	PO2
4. a.	What is Miller Indices? Write the systematic steps to obtain the Miller indies of a crystal plane with the help of a suitable example ? Find the Miller indices of a crystal plane having the intercepts 1, 2 and ∞ with crystallographic axes?	10	C03	PO2
	(OR)			
b.	Show that the reciprocal lattice of fcc is bcc and bcc is fcc?	10	C03	PO2
5. a.	Derive the expression for electromagnetic wave equation in terms of electric field and in terms of magnetic field in a conducting medium using Maxwell's equations? Discuss about the physical significance of dissipative terms?	10	C04	PO2
	(OR)			
b.	State and proof Poynting theorem ? Justify that, Poynting theorem is a statement of conservation of energy?	10	C04	PO2
6. a.	Define Uncertainty principle? Using it find the ground state energy of one dimensional harmonic oscillator?	10	C05	PO2
	(OR)			
b.	Using Schrodinger's equation, discuss the case of a one dimensional potential Step. Mention its reflection and transmission coefficients.	5	C05	PO2
c.	Normalize the wave function $\psi(x, t) = \sqrt{\frac{2}{\pi}}\cos x$ for a particle moving in one dimension between x= - $\frac{\pi}{2}$, and x= $\frac{\pi}{2}$	5	C05	PO2

--- End of Paper ---