GIET UNIVERSITY, GUNUPUR – 765022

Registration No:

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B.TECH 1ST SEMESTER EXAMINATIONS (REGULAR), NOV/DEC 2019
BBSBS1021 – ENGINEERING PHYSICS

Time : 3 Hours   Maximum : 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 × 1=10 Mark

Q1. Answer _All_ Questions.

a What is the wave length of a wave with a speed of 12 m/s and a frequency of 0.25 s^{-1} ?   CO1PO1
    a. 0.25 m   b. 1.5 m   c. 24 m   d. 48 m

b The constructive interference of light occurs when the path difference between two waves is   CO1PO1
    a. n λ   b. (2n +1) λ   c. (2n + 1) λ/2   d. none of the above

c What is the need to achieve population inversion?   CO1PO1
    a. To excite most of the atoms.   b. To bring most of the atoms to ground state
    c. To achieve stable condition   d. To achieve time of production of laser.

d The smallest portion of a crystal which when repeated in different directions generates the entire crystal is called: CO2PO1
    a. Lattice points b. Crystal lattice c. Unit cell d. None of the mentioned

e Energy band is overlapped between valence band and conduction band in   CO2PO1
    a. Insulators   b. Conductors   c. Semiconductors   d. Superconductors

f Which of the following easily adopt itself to store electrical energy?   CO3PO1
    a. Passive dielectric   b. Superconductor   c. Active dielectric   d. Polar molecules

g Curl operation result will give a   CO3PO1
    a. Vector   b. Scalar   c. Scalar or Vector   d. None

h The divergence of the vector x i + y j + z k is   CO3PO1
    a. -1   b. 1   c. 0   d. 3

i Energy released by a radiating surface is not continuous but is in the form of successive and separate packets of energy called   CO4PO1
    a) Photons   b) Protons   c) Electrons   d) Neutrons

j Compton shift is   CO4PO1
    a. Shift in frequency   b. Shift in charges   c. Shift in radiation   d. Shift in wavelength.

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

Q.2. Answer _ALL_ questions

a Give the differential equation of a damped harmonic oscillator and its solution.   CO1PO1

b What is numerical aperture of an optical fibre?   CO1PO1

c Distinguish between step index and graded index fibres.   CO1PO1

d Define Miller Indices.   CO2PO1

e A beam of X-rays is incident on a NaCl crystal with lattice plane spacing 0.282 nm. Calculate the wavelength of X-rays, if the first order Bragg reflection takes place at a glancing angle of 30˚.   CO2PO1

f What are nanomaterials? Give any two applications.   CO3PO1

g State Biot-Savart law.   CO3PO1

h Define displacement current.   CO3PO1

i Apply Heisenberg's uncertainty principle to prove that electron can't reside inside the nucleus. CO4PO1

j Give the physical significance of wave function. CO4PO1

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

Answer _ALL_ questions

Q.3

a. Explain the phenomenon of interference of light. What are the conditions to get clear and distinct interference fringes? 4 CO1PO1

b. How can you form Newton's rings? Derive an expression to find radius of nth dark ring. 6 CO1PO2

OR

c. What is LASER? Give the characteristics of laser light. 4 CO2PO1

d. Describe the construction and working of He Ne laser with neat sketches. 6 CO2PO1

Q4

a. Explain the term Brillouin zone for a lattice with a diagram. 4 CO3PO1

b. Prove that the reciprocal lattice for an FCC lattice is BCC and vice versa. 6 CO3PO2

OR

c. Describe the classification of materials based on band theory 3 CO3PO2

d. What are diamagnetic and ferromagnetic materials? Give at least two examples and two applications for each. 7 CO3PO2

Q5

a. Find grad V at the point (1, -2, -1) when $V = x^2 y z^2$. 4 CO4PO2

b. What is meant by divergence? What is $\nabla \cdot B$? State Gauss divergence theorem. 6 CO4PO2

OR

c. What is Poynting vector? 3 CO4PO1

d. Obtain the Poynting's theorem for the conservation of energy in an electromagnetic field and discuss the physical meaning of each term in the resulting equation. 7 CO4PO1

Q6

a. What is meant by wave function? Give any two of its characteristics. 4 CO5PO1

b. State and explain the postulates of wave mechanics 6 CO5PO1

OR

c. Write Schrodinger's time dependent and time independent equations in one dimension. 4 CO5PO1

d. Set up Schrodinger's equation for a particle in a one-dimensional box. Obtain its eigen values for the first four states. 6 CO5PO2

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