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| **20PH001**  **Hall Ticket Number:**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |      |  |  |  | | --- | --- | --- | | **I/IV B.Tech(Regular/Supplementary) DEGREE EXAMINATION** | | | | **March,2023** | **Common to ECE,EEE & EIE** | | | **First Semester** | **Waves and Modern Physics** | | | **Time: Three Hours** | | **Maximum:70 Marks** | |  |
| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | |  |

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| 1. | a) | | |  | | --- | | What is population inversion in Lasers? | | CO1 | L1 |  |
|  | b) | | Define the basic principle in semi conducting lasers. | CO1 | L1 |  |
|  | c) | | List out any four applications of optical fibers. | CO1 | L1 |  |
|  | d) | | Write the equation for frequency for LC circuit. | CO1 | L2 |  |
|  | e) | | What is skin effect? | CO2 | L1 |  |
|  | f) | | What is the expression for velocity of electromagnetic wave in vacuum? | CO2 | L2 |  |
|  | g) | | State Heisenberg’s uncertainty principle with any kind of equation. | CO2 | L1 |  |
|  | h) | | Write the Physical significance of a wave function (ψ). | CO2 | L1 |  |
|  | i) | | Which experiment can give the existence of matter waves? | CO3 | L1 |  |
|  | j) | | What is Magnetostriction effect? | CO3 | L1 |  |
|  | k) | | What is the advantage of using NDT technique in industry over other methods? | CO3 | L1 |  |
|  | l) | | Write any two applications of radio isotopes. | CO4 | L1 |  |
|  | m) | | What are the different type of losses in optical fibers? | CO4 | L3 |  |
|  | n) | | Write the expression for de-Broglie’s wavelength. | CO4 | L1 |  |
|  | | **Unit –I** | | | | |
| 2. | a) | | Distinguish between spontaneous emission and stimulated emission. | CO1 | L4 | 7M |
|  | b) | | Explain the construction and working of Ruby LASER system with a neat sketch. | CO1 | L1 | 7M |
|  | | **(OR)** | | | | |
| 3. | a) | | Explain the structure and principle of Optical fibers. Obtain the relations between Numerical aperture and acceptance angle. | CO1 | L1 | 7M |
|  | b) | | What are the types of optical fibers based on their modes and refractive index profile and explain them with schematic representations. | CO1 | L2 | 7M |
|  | | **Unit –II** | | | | |
| 4. | a) | | Write the Maxwell’s equations in both differential and integral forms in the case of conducting media and vacuum. | CO2 | L2 | 7M |
|  | b) | | Obtain the velocity of electromagnetic wave in vacuum. | CO2 | L2 | 7M |
|  | | **(OR)** | | | | |
| 5. | a) | | Derive an expression for resonance frequency in series LCR resonance circuit. | CO2 | L1 | 7M |
|  | b) | | What is Hall effect? Obtain an equation for Hall coefficient and give it’s significance. | CO2 | L1 | 7M |
|  | | **Unit –III** | | | | |
| 6. | a) | | What is de-Broglie hypothesis related to dual nature of matter waves? Explain it briefly. | CO3 | L2 | 7M |
|  | b) | | Describe the Dvission and Germer’s experiment with necessary theory and schematic diagram. | CO3 | L3 | 7M |
|  | | **(OR)** | | | | |
| 7. | a) | | Obtain Schrodinger time independent wave equation, show that energy of a particle in a one-dimensional potential box is quantized. | CO3 | L4 | 7M |
|  | b) | | Discuss the construction and working of scanning electron microscope with neat sketch. | CO3 | L2 | 7M |
|  | | **Unit –IV** | | | | |
| 8. | a) | | Explain the production of Ultrasonic waves by piezo electric method with neat sketch. | CO4 | L3 | 7M |
|  | b) | | List out the medical and industrial applications of ultrasonics | CO4 | L2 | 7M |
|  | | **(OR)** | | | | |
| 9. | a) | | What are radio isotopes? Give any four examples for radio isotopes. Write any two each application of medical and industrial applications of radio isotopes. | CO4 | L3 | 7M |
|  | b) | | Explain the construction and working of GM counter with a neat sketch. | CO4 | L2 | 7M |

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