GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN
(AUTONOMOUS)
(Affiliated to Andhra University, Visakhapatnam)
I B.Tech. - I Semester Regular Examinations, December / January – 2025
ENGINEERING PHYSICS

SCHEME OF VALUATION

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1. a. Explain interference in thin films due to interference of reflected light and obtain the conditions for maxima and minima.

- Explanation of reflect ray interference in a parallel thin film - 02 Marks
- Diagram related to the parallel thin film interference - 01 Mark
- Derivation of path difference, $\delta = 2\mu t \cos r + \frac{\lambda}{2}$ - 03 Marks
- Conditions for Maxima and Minima - 02 Marks

For maxima the path difference, $\delta = 2\mu t \cos r = (2n-1)\frac{\lambda}{2}$,where, n= 1, 2, 3…
For minima the path difference, $\delta = 2\mu t \cos r = n\lambda$, where, n= 0, 1, 2, 3…

1. b. What is Brewster's law? Show that reflected and refracted rays are perpendicular to each other at polarizing angle.

- Statement of Brewster's law - 02 Marks
- Diagram related to Brewster's law - 01 Mark
- Derivation to show that reflected and refracted ray are perpendicular to each other, i.e., $r + \theta_B = 90°$ - 03 Marks

2. a. Obtain expression for intensity due to Fraunhofer's diffraction due at a single slit.

- Description of Fraunhoffer diffraction due to a single slit - 02 Marks
- Diagram depicting single slit diffraction - 01 Mark
- Expression for path difference due to a single slit - 01 Marks

BN =AB $\sin\theta$ =e $\sin\theta$ and the phase difference = $\frac{2\pi}{\lambda}(e \sin\theta)$

- Derivation of Resultant amplitude,R = A $\left(\frac{\sin\alpha}{\alpha}\right)$, (where A=na) - 03 Marks
- The Intensity expression, I = $A^2 \left(\frac{\sin^2\alpha}{\alpha^2}\right)$ - 01 Mark

2. b. Describe construction and working of Nicol's prism.

- Construction of Nicol Prism - 02 Marks
- Diagram of Nicol Prism - 01 Mark
- Working of Nicol Prism - 03 Marks

3. a. State and explain second law of Thermodynamics.

- Kelvin's Statement - 02 Marks
- Explanation of Kelvin's Statement - 02 Marks
- Clausius' Statement - 02 Marks
- Explanation of Clausius' Statement - 02 Marks

3. b. Explain entropy and disorder.

- Explanation for Entropy - 03 Marks
- Explanation of disorder - 03 Marks

4. **a. State and explain Carnot's Theorem**.

- Statement of Carnot's theorem - 02 Marks
- Proof of Carnot's theorem - 06 Marks

4. b. Explain First Law of Thermodynamics

- Statement of First law of thermodynamics - 02 Marks
- Explanation of First law of thermodynamics - 04 Marks

5. a. Obtain the expression for the electric field due to a solid charged sphere using Gauss law.

- Diagram of Solid charged sphere - 01 Mark
- Derivation of Electric field at an exterior point - 02 Marks
- Derivation of Electric field on the surface of the solid sphere - 01 Mark
- Derivation of Electric field at an inside point - 03 Marks

5. b. Derive the expression for the magnetic field due to a current carrying conductor using Biot-Savart law.

- Diagram for straight current carrying conductor - 02 Marks
- Derivation of magnetic field for a straight conductor - 05 Marks

6.a. Explain Faraday's law of electromagnetic induction

- Faraday's, I law statement and expression - 3 ½ Marks
- Faraday's II law statement and expression - 3 ½ Marks

7. a. Describe the construction and working of Ruby Laser.

- Construction of Ruby Laser - 02 Marks
- Diagram of Ruby laser - 01 Mark
- Working of Ruby laser - 03 Marks
- Energy level diagram - 02 Marks

7. b. Explain different types of losses in optical Fibers Losses in Optical fibres.

- Scattering Losses - 03 Marks
- Macroscopic and Microscopic Bends - 03 Marks

8. a. Explain the propagation of light through an optical fibre and obtain the expression its numerical aperture.

- Explanation of propagation of light through an optical fiber - 03 Marks
- Diagram of Optical fiber with core and cladding - 01 Marks
- Diagram for derivation of Numerical Aperture - 01 Mark
- Derivation for Numerical Aperture - 03 Marks

$$N.A. = \sin\theta_a = \sqrt{(n_1^2 - n_2^2)}$$

8. b. Distinguish between spontaneous emission and stimulated emissions.

- Explanation for Spontaneous Emission - 03 Marks
- Explanation for Stimulated Emission - 03 Marks

S.no	Stimulated Emission	Spontane
1.	An atom in the excited state is induced to return to the ground state , thereby resulting in two photons of same frequency and energy is called Stimulated emission	The atom the grou photon, induceme emission.
2.	The emitted photons move in the same direction and is highly directional	The emi directions
3.	The radiation is highly intense , monochromatic and coherent	The radi incoheren

9.a. Apply Schrodinger's equation to a particle in a one-dimensional box and obtain the energy values and wave function.

- Diagram for Energy of particle in a box - 01 Marks
- Boundary conditions - 01 Marks
- Application of Boundary conditions and Determination of A, B & k - 02 Marks
- Calculation of Energy - 02 Marks
- Wave function - 02 Marks

9. b. Distinguish between qubits and classical bits

- Explanation of Classical Bits - 03 Marks
- Explanation of Quantum Bits - 03 Marks

S.No.	Classical Bits	Quantum Bits
1.	A Bit, also called Binary Digit or Classical Bit, is the smallest unit of information measurement in digital computing technology.	A Quantum Bit, also called Qubit, is the smallest unit of information measurement in quantum computing.
2.	A bit can have only two values, i.e. 0 and 1.	A quantum bit can have multiple values simultaneously.
3.	Classical bit does not follow superposition property.	Quantum bit follows superposition property.
4.	Bits are inherently stable, i.e. they do not change their states in the absence of external force.	Quantum bits are inherently unstable, i.e. they can change their states even no external force exists.
5.	The value or state of a bit can be determined precisely. Hence, they are deterministic.	The value or state of a quantum bit cannot be precisely determined. Hence, they are probabilistic.
6.	Bits are physically implemented through electronic and optical devices.	Quantum bits are implemented by using quantum systems like ions, atoms, superconductors, etc.
7.	Boolean operations are executed on bits.	Quantum operations are executed on quantum bits.
8.	Bits can be copied perfectly.	Quantum bits cannot be copied perfectly.
9.	The operations on bits are performed using digital logic gates, such as AND, OR, NOT, etc.	The operations on quantum bits are performed using quantum logic gates.

10.a. Obtain the expression for the wavelength of matter waves (de-Broglie's relation) and explain physical significance of wave function.

- Statement of De-Broglie Wavelength - 01 Mark
- Derivation of De-Broglie Wavelength - 04 Mark
- Physical Significance of Wave function - 03 Marks

10. b. Explain the basic idea of quantum teleportation.

- Definition of teleportation - 02 Marks
- Explanation with examples - 04 Marks