

Enrollment No. \_\_\_\_\_



**NAVRACHANA UNIVERSITY**  
# UGC recognized University

**School:** School of Engineering and Technology  
**Program/s:** B.Tech. (Civil, Mechanical, Electrical and Electronics Engineering)  
**Year:** 1<sup>st</sup> **Semester:** 2<sup>nd</sup>  
**Examination:** End Semester Examination  
**Examination year:** May - 2023

**Course Code:** PH120 **Course Name:** Engineering Physics

**Date:** 18/05/2023


**Time:** 02:00 pm to 04:00 pm

**Total Marks:** 40

**Total Pages:** 2

**Instructions:**

- Write each answer on a new page.
- Use of a calculator is permitted/not permitted.
- \* COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping

Q. No.	Details	Marks	COs*	BTL#
Q.1	Write a detailed note on the hands-on project you made using following pointers. 1. Name of the Project 2. Principle and working 3. Sketch/Schematic Drawing/Design 4. Materials used 5. Applications and Limitations	10	C01 C02 C03 C04 C06	BT2 BT3 BT5 BT6
Q.2	Answer <b>Any Three</b> questions in details. Labelled diagrams, necessary equations, derivations are required wherever applicable.	15		
1	Write a detailed note on Michelson interferometer.		C01	BT2 BT3 BT4
2	For a quantum particle confined inside an infinitely deep 1D potential well, derive allowed wave functions as well as allowed energy values. Plot the wave functions as well as probability functions for first three energy levels. Time independent Schrödinger equation for 1D wave function is given as $-\frac{\hbar^2}{2m} \frac{d^2\psi}{dx^2} + V\psi = E\psi$		C05	BT2 BT3 BT4 BT5
3	Consider a parallel beam of light incident obliquely on a double slit surface at an angle of incidence $i$ . The beam gets diffracted at an angle of $\theta$ . Derive the expression for the total deviation angle $(\theta_n+i)$ for $n^{\text{th}}$ primary maximum. Show that the deviation will be minimum when $\theta_n = i$ .			
			C01	BT2 BT3 BT4 BT5
4	Write short notes on 3-Level laser and 4-Level laser.		C03	BT2 BT3 BT4

**Q.3** Answer Any Five questions in brief.

15

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|---|---|-----|--------------------------|
| 1 | What are high order and low order modes? How are they responsible to introduce distortion in optical signal?  | C02 | BT2<br>BT3               |
| 2 | For a system having 2 energy levels, write names and mathematical expressions for rates of three fundamental light matter interaction processes in terms of absorption and emission of light.   | C03 | BT2<br>BT3               |
| 3 | Discuss with neat diagrams structures of Orthorhombic, Monoclinic and Hexagonal 3D Bravais lattices in details. Write lattice parameters for each of them.  | C06 | BT2<br>BT3               |
| 4 | What is Brewster's angle? How is it related with the refractive index of the medium?  | C01 | BT2<br>BT3<br>BT4<br>BT5 |
| 5 | Calcite is a negative birefringent crystal. With the help of a neat diagram, explain the construction of Huygens's wave fronts for o-ray and e-ray, when the optic axis is in the plane of incidence and parallel to the refracting edge. | C01 | BT2<br>BT3<br>BT4        |
| 6 | Diffraction pattern of a single slit of width 0.1 cm is formed by a lens of focal length 10 cm. Calculate the distance between the first dark and the next bright fringe from the axis. Wavelength of light used is 5000 Å.               | C01 | BT2<br>BT3<br>BT4<br>BT5 |

\*\*\*\*\*End of Question Paper\*\*\*\*\*