Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18PH1005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ENGINEERING PHYSICS – SEMICONDUCTORS, OPTICS AND QUANTUM MECHANICS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
|  | **PART – A (10X1=10 MARKS)** | | |
| 1. | \_\_\_\_\_\_\_\_\_\_ is an example for diamagnetic materials. | CO1 | 1 |
| 2. | A substance capable of conducting with zero resistance at low temperatures is called \_\_\_\_\_\_\_\_\_\_. | CO1 | 1 |
| 3. | Removal of a layer of a material in an IC is called \_\_\_\_\_\_\_\_\_\_.  (a) Oxidation (b) Diffusion (c) Etching (d) Implantation | CO2 | 1 |
| 4. | If the vibration is perpendicular to the direction of the wave, it is called as \_\_\_\_\_\_\_\_\_\_. | CO3 | 1 |
| 5. | Coherent waves means \_\_\_\_\_\_\_\_\_\_ waves.  (a) in phase (b) out of phase (c) reflected (d) diffracted | CO3 | 1 |
| 6. | Why you need an compensation plate in an Michelson Interferometer? | CO4 | 1 |
| 7. | The polished surfaces of Nicol prism is joined together using a cement called \_\_\_\_\_\_\_\_\_\_. | CO4 | 1 |
| 8. | Name any two materials that are used in Semiconductor sensors for gas sensing applications. | CO5 | 1 |
| 9. | What are matter waves? | CO6 | 1 |
| 10. | Expand SEM and TEM. | CO6 | 1 |

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|  | **PART – B (6 X 3 = 18 MARKS)** | | |
| 11. | Describe the terms retentivity and coercivity in hysteresis curve. | CO1 | 3 |
| 12. | Briefly discuss hall effect and its applications. | CO2 | 3 |
| 13. | Differentiate between the terms path difference and phase difference in a wave. | CO3 | 3 |
| 14. | Explain the terms superposition and interference in detail. | CO4 | 3 |
| 15. | Write a short note on fibre optic sensors. | CO5 | 3 |
| 16. | What are matter waves. Mention any three properties of matter waves. | CO6 | 3 |

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|  | **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | |
| 17. | a. | Compare different types of magnetic materials with its examples and applications. | CO1 | 10 |
| b. | Determine the flux density in silicon, if its magnetic field intensity is  1.20x105 Am-1 and its magnetization is -0.60 Am-1 | CO1 | 2 |
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| 18. | a. | Explain the silicon wafer based integrated circuit (IC) fabrication process with adequate diagram. | CO2 | 10 |
| b. | Calculate the wavelength of light emitted by an LED with band gap energy of 2.4 eV. | CO2 | 2 |
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| 19. | a. | Derive the equation of motion for a linear harmonic oscillator. | CO3 | 10 |
| b. | A wave has an angular frequency of 90 rad/sec and a wavelength  of 1.5 m. Calculate  (i) the angular wave number (ii) the speed of the wave. | CO3 | 2 |
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| 20. | a. | Explain the construction and working of Michelson Interferometer in detail and discuss the conditions of forming different types of fringe pattern with neat diagram. | CO4 | 10 |
| b. | What is a Nicol Prism? | CO4 | 2 |
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| 21. | a. | Summarize the theory behind the formation of Newton’s rings and derive the formulae for finding out the radius of curvature of a given convex lens using Newton’s rings. | CO4 | 10 |
| b. | In Newton’s ring experiment, the diameter of the 18th ring was found to be 0.69 cm and of the 6th ring was 0.356 cm. If the radius of the convex lens is 100 cm, compute the wavelength of the light used. | CO4 | 2 |
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| 22. |  | Classify different types of sensors. Explain in detail about the fibre optic sensor involving pressure and temperature sensors with necessary diagrams and areas of applications. | CO5 | 12 |
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| 23. | a. | Explain the application of Schrodinger wave equation to a particle in box to find the energy and wavefunction of a particle. | CO6 | 10 |
| b | Determine the de Broglie wavelength of an electron having an energy of 180 eV. | CO6 | 2 |
|  |  | **Compulsory:** |  |  |
| 24. |  | Derive the mathematical expression for Schrodinger’s time independent wave equation that describes the wave function of a quantum mechanical system. | CO6 | 12 |