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

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**End Semester Examination – Nov/Dec– 2018**

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| **Code :** | **17PH1001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **APPLIED PHYSICS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Recall and explain in detail about Davisson and Germer experiment in order to prove the existence of matter wave phenomenon with a neat sketch of the experimental setup. | CO1 | 15 |
| b. | Determine the wavelength associated with a proton having an energy  10 MeV. [Hint:- mass of proton = 1836 \* mass of electron]. | CO1 | 3 |
| c. | Explain Heisenberg’s uncertainty principle briefly. | CO1 | 2 |
| (OR) | | | | |
| 2. | a. | Apply Schrodinger’s time independent wave equation to the problem of particle in a box and derive an expression for its eigen function and eigen values. | CO1 | 15 |
| b. | An electron is confined to an atom of radius 10-11m. Calculate the minimum uncertainty in its momentum. | CO1 | 3 |
| c. | Note down any three properties of matter waves. | CO1 | 2 |
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| 3. | a. | Describe in detail the construction, principle and working of a Helium-Neon laser with necessary energy level diagrams. | CO2 | 15 |
| b. | The first line of the principal series of sodium is the D line at 590 nm. This corresponds to a transition from the first excited state to the ground state. Calculate the energy in eV of the first excited state. | CO2 | 3 |
| c. | Distinguish between spontaneous and stimulated emission of light. | CO2 | 2 |
| (OR) | | | | |
| 4. | a. | Prove the existence of stimulated emission of light with the help of Einstein’s quantum theory of radiation. | CO2 | 15 |
| b. | The ratio of population of two energy levels is 1.059 x 10-30. Find the wavelength of the light emitted from it at 300 K. | CO2 | 3 |
| c. | Recall the basic principle of holography. | CO2 | 2 |
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| 5. | a. | Derive an expression for numerical aperture in terms of acceptance angle of an optical fiber cable. | CO3 | 15 |
| b. | A graded index fiber has a core diameter of 0.06 mm and numerical aperture of 0.12 at a wavelength of 7500 Å. Find the normalized frequency. | CO3 | 3 |
| c. | Discuss the phenomenon of total internal reflection with a neat illustration. | CO3 | 2 |
| (OR) | | | | |
| 6. | a. | Sketch the block diagram of optical fiber communication system and explain its functioning in detail. | CO3 | 15 |
| b. | Calculate the refractive indices of core and cladding materials of an optical fiber if its numerical aperture is 0.22 and relative refractive index is 0.012. | CO3 | 3 |
| c. | Differentiate between single mode and multi-mode optical fibers. | CO3 | 2 |
| 7. | a. | Compile the factors affecting the acoustics of an auditorium and suggest remedies for the same. | CO4 | 15 |
| b. | An auditorium has a volume of 1500 m3. Its total absorption is equivalent to 100 m2 of open window.   1. Find the reverberation time. 2. Deduce the effect on the reverberation time, if the audience fills the hall (300) (absorption coefficient of human beings 0.45 sabines) and thereby increases the absorption. | CO4 | 3 |
| c. | State Weber-Fechner law relating loudness and intensity of a sound wave. | CO4 | 2 |
| (OR) | | | | |
| 8. | a. | Apply the piezoelectric effect to produce ultrasonic waves with a neat circuit diagram. | CO4 | 15 |
| b. | Longitudinal standing waves are set up in a quartz plate with antinodes at opposite faces. The fundamental frequency of vibration is given by the relation f = 2.87 x 103/t, where f is in Hz and t is the thickness of the plate in meter. Compute the young’s modulus of the quartz plate. | CO4 | 3 |
| c. | Define the principle of an acoustic grating briefly. | CO4 | 2 |
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| **Compulsory**: | | |  |  |
| 9. | a. | Compare the properties of dia, para and ferro magnetic materials with a neat tabular column. | CO5 | 15 |
| b. | A magnetic field of certain strength produces a magnetic flux of  3 x 10-5 Weber in an iron bar of cross sectional area 0.2 x 10-4 m2. Calculate magnetic flux density. | CO5 | 3 |
| c. | Draw the hysteresis curve and thereby explain retentivity and coercivity. | CO5 | 2 |