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

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**End Semester Examination – Nov/Dec– 2017**

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| **Code :** | **13PH201** | **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. | Describe with the necessary theory the Davisson and Germer experiment for establishing the wave nature of the electrons. | CO1 | 15 |
| b. | Calculate the wavelength associated with an electron of 1.5 eV kinetic energy. [Given that me = 9.1 x 10-31 kg] | CO1 | 3 |
| c. | State three properties of matter waves. | CO1 | 2 |
| (OR) | | | | |
| 2. | a. | Apply the Schrodinger wave equation for a particle in one dimensional box and solve the equation and obtain the eigen values and eigen function. | CO1 | 15 |
| b. | An electron is bound in one dimensional infinite potential well of width 0.12 nm. Find the energy values (in eV) in the ground state and also in the first two excited states. | CO1 | 3 |
| c. | State Heisenberg uncertainty principle. | CO1 | 2 |
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| 3. | a. | Explain with neat sketch the construction, principle and working of He-Ne laser along with energy level diagram. | CO2 | 15 |
|  | b. | A He-Ne laser is emitting a laser beam with an average power of 4.5 mW. Find the number of photons emitted per minute by the laser. The wavelength of the emitted light is 632.8 nm. | CO2 | 3 |
|  | c. | Explain stimulated emission briefly with a neat diagram. | CO2 | 2 |
| (OR) | | | | |
| 4. | a. | Explain Einstein’s quantum theory of radiation and hence prove the existence of stimulated emission. | CO2 | 15 |
|  | b. | Find the ratio of population of two energy levels, if the wavelength of light emitted at 330 K is 632.8 nm. | CO2 | 3 |
|  | c. | Name the various ways to achieve population inversion. | CO2 | 2 |
| 5. | a. | Explain the classification of optical fibre based on modes of transmission and refractive index profile in detail. | CO3 | 15 |
|  | b. | The refractive index of core and cladding materials of an optical fiber are 1.55 and 1.49 respectively. Calculate the numerical aperture and acceptance angle. | CO3 | 3 |
|  | c. | Explain the principle of optical fiber. | CO3 | 2 |
| (OR) | | | | |
| 6. | a. | What is Numerical aperture? Derive an expression for numerical aperture and angle of acceptance of fiber in terms of refractive index of core and cladding. | CO3 | 15 |
|  | b. | A fiber has a diameter of 9µm and its core refractive index is 1.50 and for cladding is 1.45. How many modes can propagate into the fiber if the wavelength of the source is 1.6µm? | CO3 | 3 |
|  | c. | Briefly explain the bending losses in optical fiber. | CO3 | 2 |
| 7. | a. | Explain any four factors affecting the architectural acoustics of a building and their remedy. | CO4 | 15 |
|  | b. | The volume of a room is 1500m3. The wall area of the room is 260m2, the floor area is 140m2 and the ceiling area is 140m2. The sound –absorption coefficient for the wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption coefficient and the reverberation time. | CO4 | 3 |
|  | c. | State Weber – Fechner law. | CO4 | 2 |
| (OR) | | | | |
| 8. | a. | What is meant by piezoelectric effect? With a neat sketch explain the production of ultrasonic waves using piezoelectric oscillator. | 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=2.87x103/t, where t is the thickness of the plate in meter. Compute i) Young’s modulus of the quartz plate, ii) the thickness of the plate required for a frequency of 1200 kHz. The density of quartz is 2600 kg m-3. | CO4 | 3 |
|  | c. | Define NDT. What is it used for? | CO4 | 2 |
|  | | ***Compulsory*:** |  |  |
| 9. | a. | Compare and tabulate the properties of dia, para and ferromagnetic materials. | CO5 | 15 |
|  | b. | A magnetic field of 1800 A/m produces a magnetic flux of 3x10-5 Weber in a magnetic bar of cross-sectional area 0.2 cm2. Calculate its magnetic permeability and relative permeability. What type of magnetism is being displayed by this material? | CO5 | 3 |
|  | c. | State Curie-Weiss law. | CO5 | 2 |

ALL THE BEST