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



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

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| **Code :** | **14PH3002** | **Duration :** | **3hrs** |
| **Sub. Name :** | **QUANTUM MECHANICS** | **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. | State Einstein Photoelectric effect. | CO1 | 4 |
| b. | Calculate the electron wavelength using the de Broglie wavelength concept for 100 eV acceleration. | CO1 | 16 |
| **(OR)** | | | | |
| 2. | a. | State Heisenberg Uncertainty principle and list the physical properties that are not measured simultaneously. | CO1 | 10 |
| b. | Mention the properties of matter waves. | CO1 | 10 |
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| 3. | a. | Derive the Schrodinger time dependent and time independent wave equations. | CO2 | 16 |
| b. | Illustrate the discrete energy levels through Planks hypothesis. | CO2 | 4 |
| **(OR)** | | | | |
| 4. | a. | Apply schrodinger wave equation for partile in a BOX problem and draw the wave pattern for different quantisations. | CO2 | 16 |
| b. | Modify the schrodinger wave equation for a three dimensional system and write the eigen function and eigen energy. | CO2 | 4 |
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| 5. | a. | Apply quantum mechanical tunneling in esaki diode and draw the energy band diagrams showing the tunneling current for improved forward bias and reverse bias. | CO3 | 15 |
| b. | Draw the negative resistance pattern of the I-V curve during tunneling mechanism. | CO3 | 5 |
| **(OR)** | | | | |
| 6. | a. | Demonstrate the working of Scanning electron microsope with suitable diagrams. | CO3 | 15 |
| b. | Differentiate the SEM and TEM interms of principle and resolution. | CO3 | 5 |
|  |  |  |  |  |
| 7. | a. | Justify that the Total angural momentum operator is commutable by deriving the orbital and spin momentum. | CO4 | 15 |
| b. | Write short notes on Expectation values. | CO4 | 5 |
| **(OR)** | | | | |
| 8. | a. | Calculate the Particle Flux by probability current density method. | CO4 | 14 |
| b. | Apply the normalization method for a wave function. | CO4 | 6 |
|  | | **Compulsory**: |  |  |
| 9. |  | Apply first order time independent perturbation theory to calculate the eigen function and eigen energy. | CO5 | 20 |