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

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

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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. | Mention the significance of the matter waves. | CO1 | 8 |
| b. | State the prime three quantum mechanical postulates with suitable examples. | CO1 | 12 |
| (OR) | | | | |
| 2. | a. | Derive the electron wave length from Einsten energy equation and comparing with Planks energy equation. | CO1 | 10 |
| b. | List out the properties of matter waves. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Demonstrate the experimental verification of matter waves by Davis and germer experiment. | CO2 | 15 |
| b. | Introduce the schrodinger wave equation and its types. | CO2 | 5 |
| (OR) | | | | |
| 4. | a. | Apply schrodinger wave equation for one dimensional square well potential. | CO2 | 16 |
| b. | Draw the electron wave motion for n=1, n=2 and n=3, and explain the eigen function and eigen value. | CO2 | 4 |
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| 5. | a. | Illustrate the electron wave pattern in the SEM and explain the working of Scanning electron Microscope. | CO3 | 10 |
| b. | Describe modes in which the SEM can be operated. | CO3 | 10 |
| (OR) | | | | |
| 6. | a. | Apply quantum mechanical tunneling mechanism and draw the progressively increasing forward bias characteristics. | CO3 | 15 |
| b. | Plot the current voltage characteristics of tunnel diode and explain the negative resistance region. | CO3 | 5 |
|  |  |  |  |  |
| 7. | a. | Formulate the following Quantum mechanical operators i) Energy operator, ii) momentum operator, iii) Kinetic energy operator and iv) Velocity operator. | CO4 | 15 |
| b. | Write short notes on Expectation values. | CO4 | 5 |
| (OR) | | | | |
| 8. | a. | Calculate the probability current density. | CO4 | 14 |
| b. | Classify the Dirac notations representing the Bra and ket vectors to represent the scalar and vectors. | CO4 | 6 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Define perturbation theory and derive the time independent first order perturbation equation. | CO5 | 14 |
| b. | Evaluate the energy and wave function for the first order perturbation. | CO6 | 6 |