



**DOON UNIVERSITY, DEHRADUN**  
**Mid Semester Examination, Second Semester, 2017-18**  
**Department of Physics, School of Physical Sciences**  
**M.Sc. Physics (Optoelectronics)**  
**Course: PHC-452: (Quantum mechanics-ii)**

*Time Allowed: 2 Hours*

*Maximum Marks: 30*

*Note: Attempt All Questions from Sections A, B, C.*

**SECTION: A**

*(Marks: 1.5 X 4 = 6)*

- Q1. What are turning points in JWKB approximation?  
 Q2. In case of Variational method show that  $E_\phi \geq E_0$ .  
 Q3. Discuss validity of JWKB approximation.  
 Q4. What is Stark effect?

**Section B**

*(Marks: 4 X 3 = 12)*

- Q5. Consider a linear harmonic oscillator. Assuming a perturbation  $H' = \frac{1}{2} bx^2$  evaluate  $W_n^{(2)}$ .  
 Q6. Discuss the application of Variational method for ground state of Helium atom.  
 Q7. What is Zeroth order JWKB approximation?

**Section C**

*(Marks: 6 X 2 = 6)*

- Q8. Discuss time dependent perturbation theory. What is Fermi Golden rule?  
 Q9. Using JWKB approximation evaluate  $\psi(x)$  in region I, II and III for the following problem –

