

**UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN**

|                |                                   |                    |                          |
|----------------|-----------------------------------|--------------------|--------------------------|
| <b>Program</b> | <b>B. Tech CS : (All Batches)</b> | <b>Semester</b>    | <b>I</b>                 |
| <b>Course</b>  | <b>ENGINEERING PHYSICS</b>        | <b>Course Code</b> | <b>PHYS1023</b>          |
| <b>Session</b> | <b>Sept - Dec, 2021</b>           | <b>Topic</b>       | <b>QUANTUM COMPUTING</b> |

1. Distinguish between classical bits and Quantum bits.
2. Suppose that  $\{|u_1\rangle, |u_2\rangle, |u_3\rangle\}$  is an orthogonal basis for a three-dimensional Hilbert's space. A system is in the state given by

$$|\psi\rangle = \frac{1}{\sqrt{5}} |u_1\rangle - i \sqrt{\frac{7}{15}} |u_2\rangle + \frac{1}{\sqrt{3}} |u_3\rangle$$

Determine if this state is normalized

3. Explain the Surface-volume ratio and Quantum Confinement.