B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00468   **Term-End Examination**

June, 2014

BIELE-009 : QUANTUM COMMUNICATION

Time : 3 hours   *Maximum Marks : 70*

*Note : Attempt any **seven** questions. All questions carry equal marks. Missing data may be suitably assumed.*

1. Differentiate between open and closed quantum system dynamics with the help of suitable example. What are the requirements of closed and open system quantum maps ?   *5+5=10*

2. Define the terms — Observables and Commutivity. Explain quantum state preparation.   *4+6=10*

3. Explain various methods of quantum state encoding and decoding.   *10*

4. With the help of suitable example explain Holevo's theorem on mutual information for ensemble of quantum states.   *10*

5. Explain "Holevo-Schumacher-Westmoreland theorem" for classical channel capacity of quantum channels. *10*

6. State – "King-Ruskai-Szarek-Werner Qubit channel representation theorem and explain its significance in quantum communication. *10*

7. Explain the procedure for Kraus Channel Representation. Define the term Channel Capacity. How is it related to Von-Neumann Entropy ? *10*

8. What are the various scaling issues in Hilbert space ? Explain in brief. *10*

9. With the help of SHOR result on entanglement assisted channel capacities, explain how quantum states are transmitted over quantum channels. *10*

10. Write short notes on any *two* of the following : *5×2=10*
   (i)   Calderbank-Shor-Steane (CSS) codes
   (ii) Reduced density matrix
   (iii) Kraus representation theorem for open system quantum evolution