00498

BIELE-009

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)
Term-End Examination
December, 2015

BIELE-009 : QUANTUM COMMUNICATION

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Missing data, if any, may be suitably assumed. Use of calculator is permitted.*

1. With reference to the basics of quantum mechanics, differentiate between the following :

    2×5=10

    (a) Pure and Mixed states

    (b) Observability and Commutivity

2. Explain the significance of Kraus representation theorem for open system quantum evolution.   *10*

3. What are the steps involved in the transmission of classical information over quantum channels ? Explain.   *10*

4. In context to Quantum information theory, explain Von Neumann Entropy with suitable mathematical expressions.   *10*

5. Distinguish between Entanglement and Quantum channel capacity. How can they be used for quantum state compression ? *10*

6. What are the steps involved in the construction of stabilizer code ? Support your answer with suitable mathematical example. *10*

7. Establish the mathematical relationship between mixed state compression and Holevo's theorem. State the assumptions made during establishing the relationship. *10*

8. Distinguish between open system measurement and positive operator valued measurement technique in quantum mechanics. *10*

9. Explain the significance of the Heisenberg uncertainty principle in quantum mechanics. *10*

10. Write short notes on any *two* of the following : *2×5=10*

   (a)   Channel Capacity

   (b)   Calderbank-Shor-Steane (CSS) Code

   (c)   Kraus Channel Representation