

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

Term-End Examination

00832

December, 2017

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. State the Heisenberg Uncertainty Principle. Explain its significance in context to quantum mechanics. 3+7=10
2. What is Kraus Representation Theorem ? How is the above theorem used for the evolution of open system quantum ? Explain in brief. 4+6=10
3. Explain the process of transmitting classical information over quantum channels. 10
4. Explain the procedure for applying Holevo's theorem for determining mutual information. 10

5. Derive an expression which establishes the relationship between mixed state compression and Holevo's theorem. 10
6. Explain the following terms : 5+5=10
(a) Entanglement
(b) Quantum channel capacity
7. What are the various notions for quantum communication over quantum channels ? Explain. 10
8. How are Shor 9 qubit codes used to protect information against bit flips and phase flips ? 10
9. Explain the stabilizer code construction technique and its use in quantum coding theory. 10
10. Write short notes on any *two* : 2×5=10
(a) Hilbert Space
(b) Von Neumann Entropy
(c) Pure States and Mixed States
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