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BIELE-009

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

Term-End Examination

00953

December, 2016

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, explain the following : *2×5=10*

   (a) Density Matrices

   (b) Partial Trace Operator

2. How does a quantum state move around, even in the absence of a quantum communication channel linking the sender of the quantum state to the receiver ? *10*

3. With reference to quantum communication theory, explain quantum state encoding and decoding techniques. *10*

4. What is the procedure for quantum phase estimation in an application ? Explain it with an appropriate quantum mathematics. *10*

5. Explain how the shore code can protect against the effect of an arbitrary error in a single qubit. *10*

6. Explain the concept of Von Neumann entropy. Also state the relation of pure state ensemble compression with Von Neumann entropy. *10*

7. Discuss the importance of Holevo's theorem in quantum computation. Also state the role of Holevo's upper bound on the accessible information. *10*

8. Explain and discuss the importance of Heisenberg uncertainty principle in the context of quantum mechanics. *10*

9. Explain stabilizer code construction technique and its use in quantum coding theory. *10*

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

    (a) Scaling issues in Hilbert space

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

    (c) Requirements of closed and open system quantum maps
