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BIELE-009

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

Term-End Examination

00996

June, 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. Differentiate between open and closed quantum system dynamics. What are the basic requirements for an open and a closed system quantum map ? *5+5=10*

2. State 'Stinespring Theorem'. Explain the relevance of this theorem in the measurement of a positive valued operator. *3+7=10*

3. What are the different steps involved in the process of encoding and decoding of a quantum state ? Explain with the help of a suitable example. *10*

4. Explain the significance of Holevo's theorem on mutual information for ensembles of quantum states. *10*

5. Establish the relationship between pure state ensemble compression with Von-Neumann entropy. What are the assumptions made while establishing the relation ? *10*

6. With reference to Quantum Coding Theory, explain how Shor's 9 qubit code protects the information against bit flips and phase flips. *10*

7. Explain the application of Holevo-Schumacher-Westmoreland theorem in finding the channel capacity of a quantum channel. *10*

8. With the help of a suitable example, explain in brief how quantum communication is done over quantum channels. *10*

9. Explain the procedure for encoding classical bits into the z-axis spin projection of an electron. *10*

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

    (a) Holevo's Theorem

    (b) Partial Trace Operator

    (c) Scaling Issues in Hilbert Space
