BIELE-009

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

Term-End Examination

ロロ4ヨヨ

June, 2018

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 scientific calculator is permitted.*

---

1. Differentiate the following :　　　　　　　*5+5=10*

    (a)　Pure states and Mixed states

    (b)　Observables and Commutivity

2. State the Stinespring theorem and explain its significance in the evolution of open system quantum.　　　　　　　*10*

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

4. Explain the procedure involved in the process of encoding and decoding the quantum states. *10*

5. State von Neumann entropy. Derive the relationship between pure state ensemble compression with von Neumann entropy. *3+7=10*

6. Explain the Holevo-Schumacher-Westmoreland theorem for classical channel capacity of quantum channel. *10*

7. What are the notions of channel additivity and explain the role of entanglement in calculating quantum channel capacity ? *4+6=10*

8. Explain Calderbank-Shor-Steane (CSS) codes used for quantum coding. *10*

9. State the following : *5+5=10*

   (a) King-Rusaki-Suarez-Werner Qubit channel representation theorem

   (b) Kraus channel representation

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

    (a) Partial Trace Operator

    (b) Scaling Issues in Hilbert Space

    (c) Density Matrix

    (d) Projective Measurements