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B.E. (Artificial Intelligence and Data Science)
QUANTUM ARTIFICIAL INTELLIGENCE
(2019 Pattern) (Semester - VII) (417523A) (Elective - III)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Solve questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data if necessary.*

Q1) a) Describe Shor's Algorithm with example.   **[6]**

   b) Explain Simon's Algorithm.   **[6]**

   c) Explain Factoring Integers, with example.   **[6]**

<div align="center">OR</div>

Q2) a) Describe Grover's Algorithm with example.   **[6]**

   b) Discuss analysis of Deutsch algorithm in details.   **[6]**

   c) Write a short note on: Phase Kick-Back.   **[6]**

Q3) a) Explain in details quantum support vector machines.   **[6]**

   b) Explain Nearest Neighbour Search in detail.   **[6]**

   c) Explain in detail - Quantum Boosting.   **[6]**

<div align="center">OR</div>

Q4) a) Write a short note on: Variational Quantum Algorithms.   **[6]**

   b) Explain Quantum Neural Networks.   **[6]**

   c) Describe classification in quantum machine learning with examples.   **[6]**

Q5) a) What are some practical challenges and limitations associated with error model encoding in quantum computing.   **[6]**

   b) Describe Quantum Key Distribution in short.   **[6]**

   c) Discuss the Classical Three-Bit Code.   **[5]**

<div align="center">OR</div>

Q6) a) Explain in short Quantum Dense Coding. **[6]**

b) Discuss in detail Quantum cryptography. **[6]**

c) Write a short Note on Fault Tolerance. **[5]**

Q7) a) Write short note on Quantum Walk. **[6]**

b) Explain Quantum Neural Computation. **[6]**

c) Write a short note on Quantum Tree Search. **[5]**

OR

Q8) a) State the challenges and limitations are associated with quantum computing in data sciences. **[6]**

b) Explain Quantum Production System in detail. **[6]**

c) Describe the Heuristic Search with example. **[5]**

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