DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MINUTES OF THE BOARD OF STUDIES

Meeting held on 10th April 2026 at 10:00AM in the Board Room

The following members were present in the meeting.

S.No	Name of the Member	Designation	Signature
1.	Dr. D. ArunaKumari, Professor &Head, CSE, VJIT	Chairman	
2.	Dr. S. Suresh Kumar, Asst Professor in IT, JNTUH UCEJ	JNTU Nominee	
3.	Dr. V. Vijaya Kumar, Dean, CSE & IT and Director C&ACR, AU	Member	
4.	Dr. M. Nagamani, Associate Professor, School of Computer an Information Sciences, University of Hyderabad	Member	
5.	Dr. M. Rama Bai, Professor, Dept. of Emerging Technology, MGIT	Member	
6.	Dr. Kalyan Sarvepalli, Principal Consultant, Infosys.	Member	
7.	Ms. G. Srija, Software Engineer, HSBC	Member	
8.	Dr. A. Obulesh, Head, IT, VJIT	Member	
9.	Dr. KSRK Sarma, Head, CSE(DS), VJIT	Member	
10.	Dr. N. Anusha, Head, CSE(AI&ML), VJIT	Member	
11.	Dr. Ravi Mathey, Professor, CSE, VJIT	Member	
12.	Dr. Ch. Ramesh, Associate Professor, CSE, VJIT	Member	
13.	Dr. K. Rajesh Kannan, Associate Professor, CSE, VJIT	Member	
14.	Mrs. B. Sailaja, Associate Professor, CSE, VJIT	Member	

Resolutions

Item No. 1 : **Approval of B.Tech Minor program in Quantum Computing Course Structure & Syllabus offered by the department of CSE to all the Departments including CSE under R25 Regulation.**

The chairman of BoS presented salient features of B.Tech. Minor Program in Quantum Computing Course Structure & Syllabus offered by the department of CSE to all departments including CSE applicable from A.Y 2025-2026 Batch.

Resolution 1 : The members after thorough discussion approved the B.Tech Minor Program in Quantum Computing Course Structure & Syllabus offered by the department of CSE to all departments and the details are given in Annexure – 1.

Noted and Approved.

Signatures of the Members Present:

1. Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Sirja	8. Dr. A. Mahesh
9. Dr. KSRK Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Minor in QUANTUM COMPUTING

Course Structure and Syllabus (R25 Regulation)

Applicable from A.Y 2025-26 Batch

Semester	Theory(#Credits) (Which is not studied in regular course)	Total Credits
II Year II Sem	Introduction to Quantum Computing	3
II Year II Sem	Quantum Programming Lab	1
III Year I Sem	Quantum Communication and Cryptography	3
III Year II Sem	Quantum Computing Applications and Project	3
III Year II Sem	Quantum Simulation Lab	1
IV Year I Sem	Quantum Information and Algorithms	3
IV Year I Sem	Project/ Experiential Learning	4
	Total Credits	**18**

1. Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3. Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. KSRK Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. C. H. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. [illegible] Sailaja		

INTRODUCTION TO QUANTUM COMPUTING

B.Tech II Year II Semester

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the fundamental principles of quantum mechanics relevant to quantum computing.
2. Explain the concepts of qubits, quantum gates, and quantum circuits.
3. Analyze and implement basic quantum algorithms.
4. Apply quantum computing frameworks such as Qiskit or Cirq for simple quantum programs.
5. Identify emerging applications of quantum computing in optimization, machine learning, and cryptography.

UNIT-I: Fundamentals of Quantum Mechanics for Computing

- Limitations of classical computing
- Classical vs quantum computation
- Mathematical foundations: vectors, matrices, complex numbers
- Linear algebra concepts for quantum systems
- Postulates of quantum mechanics
- Representation of quantum states
- Dirac notation
- Measurement postulate
- Superposition principle

UNIT-II: Qubits and Quantum Gates

- Qubit representation
- Bloch sphere representation
- Multi-qubit systems
- Tensor product and composite systems
- Quantum gates: Pauli gates (X, Y, Z), Hadamard gate, Phase gate, T gate
- Multi-qubit gates: Controlled-NOT (CNOT), SWAP gate
- Universal quantum gates
- Quantum circuit representation

1. Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3. Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Suvvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. Nitesh Sinha	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

UNIT-III: Quantum Algorithms

- Introduction to quantum algorithms
- Quantum parallelism
- Deutsch and Deutsch–Jozsa algorithms
- Grover's search algorithm
- Quantum Fourier Transform
- Shor's factoring algorithm (overview)
- Quantum Phase Estimation
- Variational Quantum Eigensolver (VQE)
- Quantum Approximate Optimization Algorithm (QAOA)

UNIT-IV: Quantum Programming and Simulation

- Introduction to quantum programming platforms
- Quantum circuit design using Qiskit / Cirq
- Quantum simulators
- Execution on cloud quantum computers
- Implementation of basic quantum algorithms
- Noise in quantum systems
- NISQ (Noisy Intermediate Scale Quantum) devices

UNIT-V: Applications of Quantum Computing

- Quantum cryptography and quantum key distribution
- Quantum communication and teleportation
- Quantum machine learning concepts
- Quantum chemistry simulations
- Optimization problems using quantum computing
- Emerging quantum technologies and future directions

SUGGESTED TEXTBOOKS:

1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press.
3. Jack D. Hidary, Quantum Computing: An Applied Approach, Springer.
4. N. David Mermin, Quantum Computer Science: An Introduction, Cambridge University Press.

1.Dr.D. Anima Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Mr. G. Srija	8. Dr. A. Obulesh
9. Dr. K. Sai Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Satlaja		

REFERENCE BOOKS:

1. Phillip Kaye, Raymond Laflamme, and Michele Mosca, An Introduction to Quantum Computing, Oxford University Press.
2. Chris Bernhardt, Quantum Computing for Everyone, MIT Press.
3. Eric R. Johnston, Nic Harrigan, and Mercedes Gimeno-Segovia, Programming Quantum Computers, O'Reilly.
4. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press.

1. Dr. D. Anitha Kumari	2. Dr. S. Suresh Kumar	3. Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. K.S.R. Varma	10. Dr. S. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

QUANTUM PROGRAMMING LAB

B.Tech II Year II Semester

Course Code:

L	T	P	C
0	0	2	1

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the fundamental principles of the course area.
2. Explain theoretical foundations and related models.
3. Analyze and implement algorithms or techniques related to the subject.
4. Use appropriate software tools or frameworks where applicable.
5. Identify practical applications and future research directions.

List of Experiments:

1. Introduction to Qiskit environment
2. Installing and configuring Qiskit
3. Creating simple quantum circuits
4. Quantum assembly language basics using QASM
5. Compose single Quantum Circuits with Q-Gates and measuring output into classical bits.
6. Compose Multi-qubit circuits with Q-Gates and measuring output into classical bits.
7. Implementation of Deutsch algorithm and visualize its results
8. Implementation of Grover search algorithm and visualize its results
9. Implementation of shors algorithm and visualize its results
10. Introduction to IBM Qiskit platform.
11. Running circuits on IBM Quantum hardware and analysis noise
12. Report preparation and experiment documentation

SUGGESTED TEXTBOOKS:

1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press.
3. Jack D. Hidary, Quantum Computing: An Applied Approach, Springer.
4. N. David Mermin, Quantum Computer Science: An Introduction, Cambridge University Press.

1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Kavitha Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. [illegible] Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

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2. Chris Bernhardt, Quantum Computing for Everyone, MIT Press.
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4. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press.

1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Garvepalli	7. Ms. G. Srija	8. Sri A. Obulesh
9. Dr. KSRK Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

QUANTUM COMMUNICATION AND CRYPTOGRAPHY

B.Tech III Year I Semester

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the fundamental principles of the course area.
2. Explain theoretical foundations and related models.
3. Analyze and implement algorithms or techniques related to the subject.
4. Use appropriate software tools or frameworks where applicable.
5. Identify practical applications and future research directions.

UNIT-I

- Basics of quantum communication
- Quantum states transmission
- Quantum channels
- Noise in quantum communication

UNIT-II

- Quantum teleportation
- Superdense coding
- Quantum repeaters

UNIT-III

- Quantum key distribution fundamentals
- BB84 protocol
- B92 protocol
- E91 protocol

UNIT-IV

- Eavesdropping strategies
- Security proofs for QKD
- Quantum cryptographic protocols

UNIT-V

- Post-quantum cryptography overview

1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. ASRK Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

- Lattice-based cryptography
- Hash-based signatures
- Future quantum communication networks

SUGGESTED TEXTBOOKS:

1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press.
3. Jack D. Hidary, Quantum Computing: An Applied Approach, Springer.
4. N. David Mermin, Quantum Computer Science: An Introduction, Cambridge University Press.

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4. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press.

1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. A. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Kanta Rao	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Ghulesh
9. Dr. K.R.L. Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mallick	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

QUANTUM COMPUTING APPLICATIONS AND PROJECT

B.Tech III Year II Semester

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the fundamental principles of the course area.
2. Explain theoretical foundations and related models.
3. Analyze and implement algorithms or techniques related to the subject.
4. Use appropriate software tools or frameworks where applicable.
5. Identify practical applications and future research directions.

UNIT-I

- Applications in optimization
- Combinatorial optimization problems
- Quantum annealing overview

UNIT-II

- Quantum chemistry simulations
- Molecular energy calculations
- Variational Quantum Eigensolver applications

UNIT-III

- Quantum machine learning
- Quantum feature spaces
- Variational quantum classifiers

UNIT-IV

- Quantum sensing and metrology
- Quantum imaging
- Precision measurements

UNIT-V

- Mini project work
- Problem formulation
- Quantum algorithm implementation

1. Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3. Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. [illegible]	10. Dr. N. Anusha	11. Dr. Ravi Mathur	12. Dr. [illegible] Ramesh
13. Dr. K. Rajesh Kannan	14. Dr. B. Sailaja		

- Project presentation and evaluation

SUGGESTED TEXTBOOKS:

1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press.
3. Jack D. Hidary, Quantum Computing: An Applied Approach, Springer.
4. N. David Mermin, Quantum Computer Science: An Introduction, Cambridge University Press.

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4. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press.

1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagamani
5. Dr. M. Rama Bai	6. Dr. Kalyani Sarvepalli	7. Ms. G. Srija	8. Dr. [illegible] Obulesh
9. Dr. [illegible] Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

QUANTUM SIMULATION LAB

B.Tech III Year II Semester

Course Code:

L	T	P	C
0	0	2	1

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the fundamental principles of the course area.
2. Explain theoretical foundations and related models.
3. Analyze and implement algorithms or techniques related to the subject.
4. Use appropriate software tools or frameworks where applicable.
5. Identify practical applications and future research directions.

List of Experiments:

1. Introduction to Qiskit environment
2. Construct 2-Qubit entanglement circuit using Qiskit Terra and Qiskit Aer
3. State vector simulator using Aer.
4. Simulation of quantum circuits with Qiskit using 2-Qubit.
5. Construct circuits with Quantum Gates such as X, H, CNOT, T using 3-Qubit
6. Emulate classical gates (AND, NAND, OR) using quantum gates.
7. Emulate Quantum key distribution for BB8 protocol using 2-Qubit.
8. Simulate Deutsch algorithm and visualize its result using 2 & 3-Qubit
9. Simulate Grover search algorithm and visualize its result using 2 & 3-Qubit
10. Simulate shors algorithm and visualize its result using 2 & 3-Qubit
11. Simulate Simons algorithm and visualize its result using 2 & 3-Qubit
12. Running circuits on IBM Quantum Hardware and analyze noise.

SUGGESTED TEXTBOOKS:

1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press.
3. Jack D. Hidary, Quantum Computing: An Applied Approach, Springer.
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5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. [illegible] Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. [illegible] Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

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5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Mr. G. Srija	8. Dr. A. Goulesh
9. Dr. K.K. Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. Ch. Ramesh
13. Dr. V. Rajesh Kannan	14. Dr. B. Sailaja		

QUANTUM INFORMATION AND ALGORITHMS

B.Tech IV Year I Semester

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the fundamental principles of the course area.
2. Explain theoretical foundations and related models.
3. Analyze and implement algorithms or techniques related to the subject.
4. Use appropriate software tools or frameworks where applicable.
5. Identify practical applications and future research directions.

UNIT-I

- Classical information vs quantum information
- Shannon entropy
- Quantum entropy and von Neumann entropy
- Quantum information measures

UNIT-II

- Quantum circuits
- Reversible computing
- Universal gate sets
- Quantum circuit complexity

UNIT-III

- Deutsch and Deutsch–Jozsa algorithms
- Bernstein–Vazirani algorithm
- Simon's algorithm

UNIT-IV

- Quantum Fourier Transform
- Phase estimation algorithm
- Applications of phase estimation

UNIT-V

- Shor's factoring algorithm (overview)

1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Nagarjuni
5. Dr. M. Rama Bai	6. Dr. Kalyan Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. Kapil Sharma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Mr. Ch. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		

- Grover's search algorithm
- Amplitude amplification
- Complexity advantages of quantum algorithms

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1. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press.
3. Jack D. Hidary, Quantum Computing: An Applied Approach, Springer.
4. N. David Mermin, Quantum Computer Science: An Introduction, Cambridge University Press.

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2. Chris Bernhardt, Quantum Computing for Everyone, MIT Press.
3. Eric R. Johnston, Nic Harrigan, and Mercedes Gimeno-Segovia, Programming Quantum Computers, O'Reilly.
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1.Dr. D. Aruna Kumari	2. Dr. S. Suresh Kumar	3.Dr. V. Vijay Kumar	4. Dr. M. Naganjani
5. Dr. M. Rekha Bai	6. Dr. Kalyani Sarvepalli	7. Ms. G. Srija	8. Dr. A. Obulesh
9. Dr. KSRK Sarma	10. Dr. N. Anusha	11. Dr. Ravi Mathey	12. Dr. CH. Ramesh
13. Dr. K Rajesh Kannan	14. Dr. B. Sailaja		