

BOARD OF STUDIES FOR PHYSICS

MINUTES OF THE MEETING

The meeting of the Board of Studies for Physics was held on 22.08.2025 at 04:00 PM.
Through Online Mode vide <https://meet.google.com/gpc-nruc-fnj>

The following members attended the meeting:

S. No	Name	Designation	Role	Signature
1	Dr. A. Raji Reddy	Director, CMR Technical Campus	Special Invitee	
2	Dr. G. Uma Devi	Assoc. Professor of Physics, CMR Technical Campus	Chairman	
3	Dr. Suresh Sripada	Assistant Professor of Physics, JNTUH UCES	University Nominated Member	
4	Dr. P Srinivas Reddy	Associate Professor of Physics, Malla Reddy University, Hyderabad.	Subject Expert	
5	Dr. Ch. Arun Kumar	Assistant Professor of Physics, Narasimha Reddy Engineering College, Hyderabad.	Subject Expert	
6	Dr. M. Tejaswi	Assistant Professor Department of Physics, CMR Technical Campus	Subject Expert	
7	Dr. D T V Dharmajee Rao	Professor & Dean Academics, CMR Technical Campus	Special Invitee	
8	Dr. V. Kesava Reddy	Professor & Head, Department of H&S, CMR Technical Campus	Special Invitee	

Dr. G. Uma Devi, Assoc. Professor of Physics & Chairman, Board of Studies welcomed all the members and presented the **R25** scheme & syllabus (w.e.f.: Academic Year 2025-26).

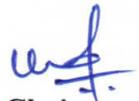
The members discussed thoroughly and made the following suggestions and recommendations:

1. As per the suggestions Unit-1 is replaced as Quantum Mechanics.

(P.T.O.)

2. Modified Crystallography and Material characterization in Unit-2 as Semiconductor Physics and Nanotechnology.
3. In Unit-3 Quantum computing as suggested elaborated the Quantum gates – Pauli's - X, Hadamard and CNOT GATE.
4. In Unit-4 Magnetism chapter added magnetoresistance and magnetostriction effect and deleted origin of magnetic moment.
5. In Unit-5 deleted CO₂ laser and eliminated sensor for structural health monitoring in optical fiber.

The Chairman concluded the meeting and thanked all the members for attending and sharing their views.



Chairman,
Board of Studies,
Department of Physics,
CMR Technical Campus.

ADVANCED ENGINEERING PHYSICS

(Common to All Branches)

I Year I Semester

Code: 25PH102BS
I Year I Semester

L T P C

3 0 0 3

Pre-requisites: 10+2 Physics

Course Objectives:

1. To understand fundamental concepts of quantum mechanics and their applications in solids.
2. To understand the working principle of semiconductor devices LED Solar cell and Material characterization techniques like XRD and SEM.
3. To introduce quantum computing principles and quantum gates.
4. To learn the properties and applications of magnetic and dielectric materials.
5. To explore the working and applications of lasers and fibre optics in modern technology.

Course Outcomes:

1. **CO1:** Apply quantum mechanical principles to explain particle behaviour and energy band formation in solids.
2. **CO2:** To analyze the characteristics of semiconductor devices and apply XRD & SEM techniques for material characterization in nanomaterials.
3. **CO3:** Understand quantum computing concepts and explain basic quantum gates.
4. **CO4:** Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.
5. **CO5:** Explain the principles of lasers and fibre optics and their applications in communication and sensing.

UNIT - I: Quantum Mechanics

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, classification of solids.

UNIT - II: Semiconductor Physics & Nanotechnology

Introduction to Semiconductors: Intrinsic and extrinsic semiconductor (qualitative), Hall effect, Direct and indirect band gap semiconductors, Construction, principle of operation and characteristics of P-N junction diode, structure, materials and working principle of LED & Solar cell. **Concept of Nanomaterials:** Introduction to nanoscience and nanotechnology, surface to volume ratio, quantum confinement, Synthesis of Nanomaterials - Ball milling method (Top-down approach), Sol-Gel method (Bottom-up approach), Characterization Techniques - X-ray diffraction: Bragg's law, calculation of average crystallite size using

Chandray *Tej* *Tej*

Tej *Tej*

Debye Scherrer's formula, scanning electron microscopy (SEM): block diagram, working principle.

UNIT - III: Quantum Computing

Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, entanglement, quantum gates - Pauli-X gate, Hadamard gate, CNOT gate, challenges and advantages of quantum computing over classical computation.

UNIT - IV: Magnetic and Dielectric Materials

Introduction to magnetic materials, Basic definitions, classification of magnetic materials, hysteresis, soft and hard magnetic materials, magneto resistance and magnetostriction effect, applications of magnetic materials and magnets for EV.

Introduction to dielectric materials, types of polarization: electronics, ionic & orientation(qualitative); ferroelectric, piezoelectric, pyroelectric materials and their applications: Load Cell and Fire sensor.

UNIT - V: Laser and Fibre Optics

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, semiconductor diode laser, applications of Laser: Bar code scanner, LIDAR for autonomous vehicle.

Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system.

TEXT BOOKS:

1. Walter Borchardt-Ott, *Crystallography: An Introduction*, Springer.
2. Charles Kittel, *Introduction to Solid State Physics*, John Wiley & Sons, Inc.
3. Thomas G. Wong, *Introduction to Classical and Quantum Computing*, Rooted Grove

REFERENCE BOOKS:

1. Jozef Gruska, *Quantum Computing*, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press.
3. John M. Senior, *Optical Fiber Communications Principles and Practice*, Pearson Education Limited.

Useful Links

- <https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber-communications-principles-and-pr.pdf>
- https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
- <https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf>
- <https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf>
- <https://www.fi.muni.cz/usr/gruska/qbook1.pdf>
- <https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf>

Handwritten signatures and notes in blue and green ink at the bottom of the page.

ADVANCED ENGINEERING PHYSICS
(Common to All Branches)
I Year I Semester

Code:25PH106BS
I Year I Semester

L T P C
0 0 2 1

Course Objectives:

1. To provide practical exposure to advanced concepts in electrical, solid-state and modern physics.
2. To study the physical properties of materials like semiconductors and ferroelectric substances.
3. To perform semiconductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

Course Outcomes:

1. **CO1:** Understanding the concept of impedance, resonant frequency, bandwidth and perform calculations.
 2. **CO2:** Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
 3. **CO3:** Characterize semiconductors using Hall effect and energy gap measurement techniques.
 4. **CO4:** Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
 5. **CO5:** Apply scientific methods for accurate data collection, analysis, and technical report writing.
1. To study the resonant frequency, band width and quality factor of LCR circuit.
 2. Determination of energy gap of a semiconductor.
 3. a. To study the V-I characteristics of solar cell.
b. To study the V-I characteristics of LED.
 4. Determination of Hall coefficient and carrier concentration of a given semiconductor.
 5. To determine work function and Planck's constant using photoelectric effect.
 6. To study the V-I characteristics of a p-n junction diode.
 7. Determination of dielectric constant of a given material.
 8. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
 9. a. Determination of wavelength of a laser using diffraction grating.
b. Study of V-I characteristics of a given laser diode.
 10. a. Determination of numerical aperture of a given optical fibre.
b. Determination of bending losses of a given optical fibre.

Note: Any 8 experiments are to be performed.

Checked by

Dr. Anand

CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B. Tech I Year Syllabus
Common for CSE (AIML) & CSE (DS)

I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	25MA101BS	Matrices and Calculus	3	1	0	4
2	25PH102BS	Advanced Engineering Physics	3	0	0	3
3	25EC103ES	Basic Electrical Engineering	3	0	0	3
	25CS104ES	Programming for Problem Solving	3	0	0	3
3	25ME105ES	Computer Aided Engineering Graphics	0	1	2	2
6	25PH106BS	Advanced Engineering Physics Laboratory	0	0	2	1
7	25EC107ES	Basic Electrical Engineering Lab	0	0	2	1
8	25CS108ES	Programming for Problem Solving Lab	0	0	2	1
9	25CS109ES	Python Programming Lab	0	0	2	1
10	25CS110ES	IT Workshop	0	0	2	1
		Induction Program				
		Total Credits	12	2	12	20

II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	25MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	25CH202BS	Engineering Chemistry	3	0	0	3
3	25EN203HS	English for Skill Enhancement	3	0	0	3
4	25EC204ES	Basic Electronics	3	0	0	3
5	25CS205ES	Data Structures	3	0	0	3
6	25CH206BS	Engineering Chemistry Laboratory	0	0	2	1
7	25EN208HS	English Language and Communication Skill Laboratory	0	0	2	1
8	25CS207ES	Data Structures Laboratory	0	0	2	1
9	25CS208ES	Idea and Innovation Lab	0	0	2	1
		Total Credits	15	1	8	20

