SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF HUMANITIES AND SCIENCES (PHYSICS)

BOS -Minutes of Meeting

Advanced Engineering Physics – R-25

DATE: 14th August, 2025 Thursday **Time: 10.00 AM – 12.00 Noon**

PLATFORM: GOOGLE MEET

Meeting Link: https://meet.google.com/yih-cgst-shi?authuser=0&pli=1

IN ATTENDANCE:

S.No	Name, & Address of the member	Designation	BOS Position	Signature
01.	**Dr.D.Srinivas Reddy**, Sreyas Institute of Engineering & Technology,Nagole , Hyderabad	**Professor & Dean**	**Chairperson**	
02.	**Dr.K.Vijay Kumar** Department of Physics, JNTUH University College of Engineering Sultanpur, Sultanpur (V) Sanga Reddy-Dist. Telanagna-502273.	**Professor**	Member- **JNTUH Nominee**	
03.	**Prof. Udaykumar Khanapuram** PhD (IIT Madras), *Department of Physics,* Room No: 414, NIT Warangal,Hanamkonda, Telanagana.	**Assistant Professor Gr-I**	Member From NIT **Subject Expert-1**	
04.	**Dr.M.Sreenath Reddy** Asso.Professor, Dept.of Physics, University College of Science, Osmania University,Hyderabad, Telangana	**Asso.Prof.**	Member From Osmania University **Subject Expert-2**	
05.	**Dr.Y.Purushotham,** Scientist-D, C-MET, Phase III, cherlapalli, , Secunderabad, Telangana 501302	**Scientist-D**	Member From Industry **/R&D Expert**	

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06.	**Dr.G.Narsinga Rao** Dept.of Hum.& Sciences, Marri Laxman Reddy Institute of Technology and Management, Dundigal, Hyderabad,	**Professor & Dean-R&D**	**Member** from Affiliated **Autonomous Colleges**	
07.	**Ms.G.Umamaheshwari, Student of Sreyas Inst.of Engg. & Tech., Nagole, Hyderabad.**	**Sreyas Alumni**	Member **Alumni**	14/8/25
08.	**Mr.Y.Kiran Kumar, Dept.of Hum. & Sciences,** Sreyas Institute of Engineering & Technology, Nagole , Hyderabad.	Asst.Prof.	**Member** Internal Faculty	14/8/25
09.	**Dr.G.Suman, Dept.of Hum.& Sciences,** Sreyas Institute of Engineering & Technology, Nagole , Hyderabad.	Asso.Prof.	**Member** Internal Faculty	14/08/2025
10.	**Mr.S.Satish Goud , Dept.of Hum.& Sciences,** Sreyas Institute of Engineering & Technology, Nagole , Hyderabad.	Asso.Prof.	**Member** Internal Faculty	14/8/25
11.	**Dr.Y.Srinivas, Dept.of Hum.& Sciences,** Sreyas Institute of Engineering & Technology, Nagole , Hyderabad.	Asst.Prof.	**Member** Internal Faculty	14/8/25
12.	**Dr.M.Chandrika, Dept.of Hum.& Sciences,** Sreyas Institute of Engineering & Technology, Nagole , Hyderabad.	Asst.Prof.	**Member** Internal Faculty	
13	**Mr.K.Nagaprasad, Dept.of Hum.& Sciences,** Sreyas Institute of Engineering & Technology, Nagole , Hyderabad.	Asst.Prof.	**Member** Internal Faculty	K.Nag 14/8/25

THE MINUTES:

Agenda: The meeting was initiated by Dr.D.SRINIVAS REDDY , Professor of Physics & BOS-Chairperson of **" Physics"** for the approval of I B.Tech **"Advanced Engineering Physics"** (Theory) syllabus & I B.Tech Advanced Engineering Physics laboratory Syllabii.

1. **Dr. D. Srinivas Reddy, Professor & Dean Exams, BOS Chairperson**, Department of H&S, Sreyas Institute of Engineering & Technology, welcomed the Board of Studies members of Physics and introduced to the faculty of SIET and internal members of BOS.

2. **Dr. K. Vijay Kumar, Professor, JNTUH NOMINEE**, has given the overview of Advanced Engineering Physics syllabus (R-25) and emphasized the application of physics knowledge to solve engineering problems. He gave the justification of introducing the concepts of Quantum Computing which bridges the gap between theoretical physics and practical engineering applications. It provides a strong foundation in physics principles while equipping individuals with the tools to solve real-world engineering problems. This interdisciplinary field is highly relevant to modern challenges in the field of engineering and sustainable technologies. Advanced Engineering Physics involves learning how to model, analyze, and design systems based on physical principles, which is essential for creating practical and efficient skill sets to the budding engineers.

3. **Dr. D. Srinivas Reddy, Professor & Dean Exams, BOS Chairperson** presented the syllabus of Advanced Engineering Physics and Advanced Engineering Physics Laboratory of B.Tech 1st year prepared by internal committee members of SIET for discussion to the forum.

4. **Dr. M. Sreenath Reddy**, Prof of Physics, Osmania University, **Prof. Uday kumar Khanapuram,** NIT Warangal, **Dr.G.Narsinga Rao,** Professor, Dean-R&D MLRIT & **Dr.Y.Purushotham,** Scientist-D along with internal members discussed about the Advanced Engineering Physics (Theory and Practical) syllabus under R-25 Regulations and arrived the consensus on the syllabi which is to be adapted from the **Academic Year: 2025-26.**

The following modifications are suggested by the BOS committee after discussion:

ADVANCED ENGINEERING PHYSICS (Theory) :

1.UNIT-I: CRYSTALLOGRAPHY & MATERIALS CHARACTERIZATION

(i) No changes has been suggested

2. UNIT-II: QUANTUM MECHANICS

(i) No changes has been suggested

3. UNIT-III: QUANTUM COMPUTING

i. Evolution of quantum systems is reframed as **development of Quantum Systems**

~~ii. quantum algorithm; **Deutsch-Jozsa** is removed~~

4.UNIT - IV: MAGNETIC AND DIELECTRIC MATERIALS

i. No changes has been suggested

5. UNIT - V: LASER AND FIBER OPTICS

(i) No changes has been suggested

ADVANCED ENGINEERING PHYSICS LABORATORY:

No change has been suggested

The meeting was concluded with **vote** of thanks to all external and internal members of physics board **proposed** by **Mr. Y. Kiran Kumar,** Asst.Prof. **of SIET** .

Dr. D. Srinivas Reddy
Professor & Dean Exams,
BOS Chairperson, SIET.

Dr. K. Vijay Kumar,
Professor of Physics
JNTUH -NOMINEE

Dr. M. Sreenath Reddy,
Prof of Physics
Osmania University

Prof. Udaykumar Khanapuram,
Asst.Professor Gr-1
NIT Warangal

G. Narsinga Rao,
Professor, Dean-R&D
MLRITM

Dr. Y. Purushotham
Scientist-D,C-MET,
Cherlapally, Hyderabad.

Ms. G. Umamaheshwari
Alumni, SIET.

Mr. Y. Kiran Kumar
Dept. of H&S, SIET.

Dr. G. Suman
Dept. of H&S,SIET.

Mr. S Satish Goud
Dept. of H&S, SIET.

Dr. Y. Srinivas
Dept. of H&S, SIET.

Dr. M. Chandrika
Dept. of H&S, SIET.

Mr. K. Nagaprasad
Dept. of H&S, SIET.

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R25 B.Tech CSE/CSE-AIML/ECE /Mech. Syllabus SIET Hyderabad

PH102BS: ADVANCED ENGINEERING PHYSICS

I B.Tech – I & II Sem

L	T	P	C
3	0	0	3

Pre-requisite: 10+2 Physics

Course Objectives:

1. To study crystal structures, defects, and material characterization techniques like XRD and SEM.
2. To understand fundamental concepts of quantum mechanics and their applications in solids and nano-materials.
3. To introduce quantum computing principles, quantum gates, and basic quantum algorithms.
4. To learn the properties and applications of magnetic and dielectric materials.
5. To explore the working and applications of lasers and fiber optics in modern technology.

Course Outcomes:

CO1: Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material Characterization.

CO2: Apply quantum mechanical principles to explain particle behavior and energy band formation in solids.

CO3: Understand quantum computing concepts, use quantum gates and Explain basic quantum algorithms CO4: Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.

CO4: Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.

CO5: Explain the principles of lasers and fibre optics and their applications in communication and sensing.

UNIT – I: Crystallography & Material Characterization

Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects. Concept of nanomaterials –Surface to volume ratio , X -ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye-Scherer's formula, scanning electron microscopy (SEM): block diagram, working principle

UNIT - II: 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, formation of energy bands, origin of band gap, classification of solids, Concept of discrete energy levels and quantum confinement in nanomaterials.

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, quantum computing system for information processing, development of of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Deutsch-Jozsa, Shor, Grover

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UNIT - IV: Magnetic and Dielectric Materials

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using Sol-gel method, Applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.

Introduction to dielectric materials, types of polarization (qualitative): electronic, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM).Load cell and Fire sensor

UNIT - V: Laser and Fibre Optics

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, meta stable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO_2 laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for automatic 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, sensor for structural health monitoring.

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

1. Dr.D.Srinivas Reddy-BOS-Chairperson
2. Dr.K.Vijay Kumar- JNTUH – Nominee
3. Prof. Udaykumar . K (Sub. Expert-1)
4. Dr.M.Sreenath Reddy (Sub. Expert-2)
5.
6.
7. 14/8/25
8. 14/8/25
9. 14/08/2025
10. 14/8/25
11.
12. 26/8/25
13. 14/8/25

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PH102BS: ADVANCED ENGINEERING PHYSICS LAB

I B.Tech – I Sem & II Sem

L	T	P	C
0	0	2	1

Pre-requisite: 10+2 Physics

Course Objectives:

1. To provide practical exposure to advanced concepts in solid-state and modern physics
2. To synthesize and study the physical properties of materials like semiconductors, ferromagnetic, 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:

CO1: Synthesize and analyze nanomaterials such as magnetite (Fe_3O_4) using chemical methods.

CO2: Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.

CO3: Characterize semiconductors using Hall effect and energy gap measurement techniques.

CO4: Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.

CO5: Apply scientific methods for accurate data collection, analysis, and technical report writing.

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List of Experiments :

1. Synthesis of magnetite (Fe_3O_4) powder using sol-gel method.
2. Determination of energy gap of a semiconductor.
3. Determination of Hall coefficient and carrier concentration of a given semiconductor.
4. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
5. Study of B-H curve of a ferro magnetic material.
6. Study of P-E loop of a given ferroelectric crystal.
7. Determination of dielectric constant of a given material
8. Determination of Curie's temperature of a given ferroelectric material.
9. A. Determination of wavelength of a laser using diffraction grating.
   B. Study of V-I & L-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 has to be performed.

1. Dr.D.Srinivas Reddy-BOS-Chairperson 14/08/25

2. Dr.K.Vijay Kumar- JNTUH – Nominee

3. Prof. Udaykumar . K (Sub. Expert-1)

4.Dr.M.Sreenath Reddy (Sub. Expert-2)

5. 6. 7. 14/8/25 8. 9. 19.08.2025

10. 14/8/25 11. 14/8/25 12. M. Chandhu 26/8/25 13. K. Naga 14/8/25