K.S.R.M COLLEGE OF ENGINEERING

UGC-Autonomous
Kadapa,AP
www.ksrmce.ac.in

Dated: 25-06-2019

Lr./KSRMCE/Principal Office /2019-20/

Principal Office Orders

As per the decisions of the Academic Council meeting held on 15- 06 –2019 the undersigned members are been appointed as the Board of studies for PHYSICS for a period of 2 years.

S.No.	Name	Designation
1.	G.C. Venkata Subbaiah	Asst.Prof KSRMCE
2	Dr. K. Venugopal Reddy	Prof&HOD NIT,Warangal
3	Prof. V. R.K.Murthy	Prof in Physics(Rtd.,)VIT,Amaravathi
4	Dr. K. Thyagarajan	Prof&HOD in Physics JNTUACE,Pulivandula
5	Sri Y Ramana Reddy	Asst.Prof KSRMCE
6	Sri D.Mallikarjuna Reddy	Asst.Prof KSRMCE

The orders will come in to force for with immediate effect.

V. S. S. Murty

Principal

PRINCIPAL
K.S.R.M. COLLEGE OF ENGINEERING
KADAPA - 516 003. (A.P.)

Cc to:

The Management/ Director for information
The HoD of H&S for necessary actions
The Members for Information
The Website Committee for upload

BOARD OF STUDIES MEETING – 2020-21
K.S.R.M COLLEGE OF ENGINEERING
AUTONOMOUS

Minutes of the Meeting

Date	**10.01.2021**	**Day**	**Sunday**
Time	**11 AM**	**Venue**	**Virtual meeting:** https://meet.google.com/zvg-vstj-oeb
Dept./SS	**Humanities and Sciences (Physics)**	**Convener**	**Sri.G.C.Venkata Subbaiah**

MembersPresent:08

S.No	Name	Designation	Signature
1.	Sri.G.C.Venkata Subbaiah	Assistant Prof., in Physics, KSRMCE	
2.	Prof .K.Thyagarajan	Professor and HOD, JNTUP	
3.	Prof . K.Venugopal Reddy	Professor and HOD, NIT, Warangal	
4.	Prof. V.R.K Murthy	Professor of Physics, VIT, Andhra Pradesh	
5.	Sri. R. Jaya Prakash Reddy	Industry list	
6.	Sri. D. Gangi Reddy	Alumni	
7.	Sri.Y. Ramana Reddy	Assistant Prof., KSRMCE	
8.	Sri.D.Mallikarjuna Reddy	Assistant Prof., KSRMCE	

Members Absent: 00

S.No	Name	Designation

Sri.G.C.Venkata Subbaiah, welcomed all the members to the meeting and presented the agenda of the meeting.

There solutions are:

	To do item	Discussion	Resolution	Coordinator/in-charge
1	To finalize the curriculum and syllabus for I sem & II sem B.Tech under R20 Regulations.	The Board of Chairman has presented the syllabus designed by the faculty after taking the feedback from all stakeholders and comparing with premier institute syllabus	The committee suggested few modifications in Engineering Physics and Applied Physics has approved and lab also approved	Sri.G.C.Venkata Subbaiah
2..	To finalize the open electives for V, VI, VII & VIII sem B.Tech under R18 regulations.	The Board of Chairman has presented the syllabus designed by the faculty after taking the feedback from all stake holders and comparing with premier institute syllabus.	The committee has approved the open electives with few suggestions for V, VI, VII & VIII Sem B.Tech.	Sri.G.C.Venkata Subbaiah
3.	To finalize and approve the syllabus for Certificate Courses.	The Board of Chairman has presented the syllabus designed by the faculty after taking the feedback from all stakeholders and comparing with premier institute syllabus	The committee appreciated the courses and approved the content for offering Certificate Courses to implement in 2020-21.	Sri.G.C.Venkata Subbaiah

The Head of the Department have proposed the Vote of thanks and concluded the meeting.

Convener

V.S.S.Murty

Principal

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Course Title	APPLIED PHYSICS				B. Tech. I – Sem (EEE, ECE) & II - Sem (CSE, AI&ML)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
20AP102/ 20AP202	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		3	0	0	3	40	60	100
						End Exam Duration: 3Hrs		

Course Objectives:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction related to its Engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de-Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Course Outcomes:

CO1	**Analyze** the differences between interference and diffraction with applications
CO2	**Identifies** the Engineering applications of lasers and the applications of optical fibers in various fields.
CO3	**Understands** the response of dielectric and magnetic materials to the applied electric and magnetic fields.
CO4	**Interpret** the concepts of classical and quantum free electron theories
CO5	**Elaborate** the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors.

Unit-I: Wave Optics **10hrs**

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Unit Outcomes:

The students will be able to

- Explain the need of coherent sources and the conditions for sustained interference.
- Identify engineering applications of interference.
- Analyze the differences between interference and diffraction with applications.

Unit-II: Lasers and Fiber optics **8hrs**

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Semiconductor diode laser- Applications of lasers.

Fiber optics-Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Block diagram of Optical fiber Communication system – Propagation Losses (qualitative) – Applications.

Unit Outcomes:

The students will be able to

- Understand the basic concepts of LASER light Sources.
- Apply the concepts to learn the types of lasers.
- Identifies the Engineering applications of lasers.
- Explain the working principle of optical fibers.
- Classify optical fibers based on refractive index profile and mode of propagation.
- Identify the applications of optical fibers in various fields.

Unit-III: Dielectric and Magnetic Materials **8hrs**

Dielectric Materials-Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

Magnetic Materials-Introduction to magnetic materials (Origin of magnetic moment of an atom and Classification of magnetic materials) –Weiss theory of ferromagnetism-soft ferrites and hard ferrites- Hysteresis – Soft and Hard magnetic materials- Applications magnetic materials.

Unit Outcomes:

The students will be able to

- Explain the concept of dielectric constant and polarization in dielectric materials.
- Summarize various types of polarization of dielectrics.
- Interpret Lorentz field and Claussius-Mosotti relation in dielectrics.
- Classify the magnetic materials based on susceptibility and their temperature dependence.
- Explain the applications of dielectric and magnetic materials.
- Apply the concept of magnetism to magnetic devices.

Unit IV: Quantum Mechanics, Free Electron Theory **10hrs**

Quantum Mechanics- Dual nature of matter – Schrodinger's time independent and dependent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory-Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

Unit Outcomes:

The students will be able to

- Explain the concept of dual nature of matter.
- Understand the significance of wave function.
- Interpret the concepts of classical and quantum free electron theories.
- Explain the importance of K-P model
- Classify the materials based on band theory.
- Apply the concept of effective mass of electron.

Unit – V: Semiconductors and Superconductors **10hrs**

Semiconductors- Introduction – Intrinsic semiconductors – Electrical conductivity – Fermi level – Extrinsic semiconductors –Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) –High T_c superconductors – Applications of superconductors.

Unit Outcomes:

The students will be able to

- Classify the energy bands of semiconductors.
- Interpret the direct and indirect band gap semiconductors.
- Identify the type of semiconductor using Hall effect.
- Identify applications of semiconductors in electronic devices.
- Explain how electrical resistivity of solids changes with temperature.
- Classify superconductors based on Meissner's effect.
- Explain Meissner's effect, BCS theory & Josephson effect in superconductors.

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu& Dr. P.G. Krishnasagar,S. Chand and Company
2. Optics- AjoyGhatak, McGraw Hill Publishers,6th edition,1stJanuary,2018.
3. Fundamental of Physics- Halliday, Resnick and Walker, Wiley publications.
4. Solid State Physics, Hall H E, paramount Publications

Reference Books:

1. Engineering Physics – K.Thyagarajan, McGraw Hill Publishers
2. Semiconductor Devices-S.M.Sze , Wiley Publications.
3. Lasers & Non-linear Optics Nelkon M parker P, Arnold Heinemann Publications
4. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill

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KADAPA - 516 003. (A.P.)

Course Title	ENGINEERING PHYSICS				B. Tech. I – Sem (CE)& II - Sem (ME)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
20EP102/ 20EP202	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		3	1	0	3	40	60	100
						End Exam Duration: 3Hrs		

Course Objectives:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction related to its Engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibers along with engineering applications
- To open new avenues of knowledge in magnetic materials which find potential in the emerging micro device applications? Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano material, their properties and applications in modern emerging technologies are elicited.
- To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.

Course Outcomes:

CO1	**Understand** the different realms of physics and their applications in both scientific and technological systems through physical optics.
CO2	**Identify** the wave properties of light and the interaction of energy with the matter.
CO3	**Illustrate** the response of magnetic materials to the applied electric and magnetic fields.
CO4	**Explain** the basic concepts of acoustics and ultrasonic.
CO5	**Classify** the important properties of crystals like the presence of long-range order, periodicity and structure determination using X-ray diffraction technique.

Unit-I: Wave Optics **10hrs**

Interference- Principle of superposition – Interference of light – Conditions for sustained interference – Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings- Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Unit Outcomes:

The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference
- **Identify** engineering applications of interference
- **Analyze** the differences between interference and diffraction with applications

Unit-II: Lasers and Fiber optics **8hrs**

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics-Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Block diagram of Optical fiber Communication system - Propagation Losses (Qualitative) – Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources
- **Apply** the concepts to learn the types of lasers
- **Identifies** the Engineering applications of lasers
- **Explain** the working principle of optical fibers
- **Classify** optical fibers based on refractive index profile and mode of propagation

UNIT III:Engineering Materials **10hrs**

Magnetic Materials- Introduction to magnetic materials - Classification of magnetic materials: Dia, Para & Ferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition, Sol-Gel method – Characteristics of nanomaterials - Applications of nanomaterials.

Unit Outcomes:

The students will be able to

- **Classify** the magnetic materials based on susceptibility and their temperature dependence
- **Explain** the applications of magnetic materials
- **Apply** the concept of magnetism to magnetic devices
- **Identify** the nanosize dependent properties of nanomaterials
- **Illustrate** the methods for the synthesis and characterization of nanomaterials

Unit-IV: Acoustics and Ultrasonics **10hrs**

Acoustics- Introduction – Requirements of acoustically good hall – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties –Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating — Pulse echo system through transmission and reflection modes – Applications.

Unit Outcomes:

The students will be able to

- **Explain** how sound is propagated in buildings
- **Analyze** acoustic properties of typically used materials in buildings

- **Recognize** sound level disruptors and their use in architectural acoustics
- **Identify** the use of ultrasonics in different fields

Unit-V: Crystallography andX-ray diffraction **8hrs**

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-ray diffraction - Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

Unit Outcomes:
The students will be able to

- **Classify** various crystal systems
- **Identify** different planes in the crystal structure
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer
- **Apply** powder method to measure the crystallinity of a solid.

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Krishnasagar, S.Chand and Company
2. Optics- Ajoy Ghatak , McGraw Hill Publishers,6th edition,1stJanuary,2018.
3. Fundamental of Physics-Halliday, Resnick and Walker, Wiley publications.
4. Solid State physics, Hall H E, paramount Publications

Reference Books:

1. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers.
2. Acoustic Waves and Oscillations- Sen S N, Prism Publications.
3. Lasers & Non-linear Optics Nelkon M parker P, Arnold Heinemann Publications
4. Solid State Physics-Kittels-8th edition,1st January-2015,Wiley Publications.

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Course Title	APPLIED PHYSICS LAB				B. Tech. I – Sem (EEE, ECE) & II - Sem (CSE, AI&ML)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
		L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
20AP107/ 20AP207	BSC	0	0	3	1.5	40	60	100
						End Exam Duration: 3Hrs		

Course Objectives:

- **Understand** the role of Optical fiber parameters in engineering applications
- **Identify** the generation of magnetic field through current carrying conductor.
- **Recognize** the importance of interference and diffraction.
- **Illustrates** the magnetic and dielectric materials applications.
- **Apply** the principles of semiconductors in various electronic devices.

Course Outcomes:

CO1	**Operate** various optical and electronic instruments.
CO2	**Apply** the concepts of interference and diffraction to determine various parameters
CO3	**Estimate** wavelength of laser and particles size using laser.
CO4	**Evaluate** the acceptance angle of an optical fiber and numerical aperture.
CO5	**Plots** the intensity of the magnetic field of circular coil carrying current with distance

Note: In the following list, out of 12 experiments, any 8 experiments must be performed in a semester

List of Experiments:

1. Determine the thickness of the wire using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope.
   Estimate the thickness of the wire using wedge shape method
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film.
2. Determination of the radius of curvature of the lens by Newton's ring method
   Experimental outcomes:
   Operates optical instrument like travelling microscope.
   Estimate the radius of curvature of the lens
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film.
   Plots the square of the diameter of a ring with no. of rings
3. Determination of wavelength by plane diffraction grating method
   Experimental outcomes:
   Operates optical instrument like spectrometer.
   Estimate the wavelength of the given source
   Identifies the formation of grating spectrum due diffraction.
4. Determination of dispersive power of prism.
   Experimental outcomes:
   Operates optical instrument like spectrometer.
   Estimate the refractive index and dispersive power of the given prism
   Identifies the formation of spectrum due to dispersion.
5. Determination of wavelength of LASER light using diffraction grating.
   Experimental outcomes:

Operates various instrument
Estimate the wavelength of laser source
Identifies the formation of grating spectrum due diffraction.

6. Determination of particle size using LASER.
   Experimental outcomes:
   Operates various instrument
   Estimate the Particles size using laser
   Identifies the application of laser
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit.
   Estimate the numerical aperture and acceptance angle of a given optical fiber.
   Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications.
8. Determination of dielectric constant by charging and discharging method.
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit.
   Estimate the dielectric constant of the given substance.
   Identifies the significance of dielectric constant in various devices.
9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit.
   Estimate the magnetic field along the axis of a circular coil carrying current.
   Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)
10. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
    Experimental outcomes:
    Operates various instruments and connect them as per the circuit.
    Estimate the hysteresis loss, coactivity and retentivity of the ferromagnetic material.
    Classifies the soft and hard magnetic material based on B-H curve.
    Plots the magnetic field H and flux density B
11. To determine the resistivity of semiconductor by Four probe method

Experimental outcomes:
Operates various instruments and connect them as per the circuit.
Estimate the resistivity of a semiconductor.
Identifies the importance of four probe method in finding the resistivity of semiconductor.

12. To determine the energy gap of a semiconductor
    Experimental outcomes:
    Operates various instruments and connect them as per the circuit.
    Estimate the energy gap of a semiconductor.
    Illustrates the engineering applications of energy gap.
    Plots1/T with log R.

Text books:

1. S.Balasubramanian, M.N.Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. Physics Laboratory Manual by Loyd D H, Cengage learning, 4Th International Edition 2014.
3. Et.Al. Engineering Physics Lab Manual by MadhusudhanaRao, SCITECH PUBLICATIONS (INDIA) PVT.LTD, 2015.
4. Practical Physics by K.Venugopalan (Author), VimalSaraswat (Author), Himanshu Publications (1 January 2018)

References:

1. Physics Laboratory Experiments, by Jerry Wilson (Author), Cecilia A. Hernandez-Hall (Author), Brooks/cole; 7th edition (11 June 2009)
2. Lab manual Physics, R Rangarajan, R P Manchanda, R K Gupta, Rajesh Kumar NeenaSinha-NewSaraswati House
3. Practical Physics by Kumar P. R. Sasi, Prentice-Hall of India Pvt.Ltd

Weblink:

1. http://vlab.amrita.edu/index.php - Virtual Labs, Amrita University.

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Course Title	ENGINEERING PHYSICS LAB				B. Tech. I – Sem (CE)& II-Sem (ME)		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
		L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
20EP107/ 20EP207	BSC	0	0	3	1.5	40	60	100
						End Exam Duration: 3Hrs		

Course Objectives:

- **Understand** the role of Optical fiber parameters in engineering applications
- **Identify** the generation of magnetic field through current carrying conductor.
- **Apply** the concepts of interference and diffraction.
- **Illustrates** the magnetic materials applications.
- **Recognize** the significance of laser by studying its characteristics and its application in finding the particle size.

Course Outcomes:

CO1	**Operate** various optical and electronic instruments.
CO2	**Apply** the concepts of interference and diffraction to determine various parameters
CO3	**Estimate** wavelength of laser and particles size using laser.
CO4	**Evaluate** the acceptance angle of an optical fiber and numerical aperture.
CO5	**Plots** the intensity of the magnetic field of circular coil carrying current with distance

Note: In the following list, out of 12 experiments, any 8 experiments must be performed in a semester

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2. Determination of the radius of curvature of the lens by Newton's ring method
   Experimental outcomes:
   Operates optical instrument like travelling microscope.
   Estimate theradius of curvature of the lens
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film.
   Plotsthe square of the diameter of a ring with no. of rings
3. Determination of wavelength by plane diffraction grating method
   Experimental outcomes:
   Operates optical instrument like spectrometer.
   Estimate the wavelength of the given source
   Identifies the formation of grating spectrum due diffraction.
4. Determination of dispersive power of prism.

Unit-II: Lasers and Fiber optics **8hrs**

Lasers-Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics-Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Block diagram of Optical fiber Communication system - Propagation Losses (Qualitative) – Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources
- **Apply** the concepts to learn the types of lasers
- **Identifies** the Engineering applications of lasers
- **Explain** the working principle of optical fibers
- **Classify** optical fibers based on refractive index profile and mode of propagation

UNIT III:Engineering Materials **10hrs**

Magnetic Materials- Introduction to magnetic materials - Classification of magnetic materials: Dia, Para & Ferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition, Sol-Gel method – Characteristics of nanomaterials - Applications of nanomaterials.

Unit Outcomes:

The students will be able to

- **Classify** the magnetic materials based on susceptibility and their temperature dependence
- **Explain** the applications of magnetic materials
- **Apply** the concept of magnetism to magnetic devices
- **Identify** the nanosize dependent properties of nanomaterials
- **Illustrate** the methods for the synthesis and characterization of nanomaterials

Unit-IV: Acoustics and Ultrasonics **10hrs**

Acoustics- Introduction – Requirements of acoustically good hall – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties –Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating — Pulse echo system through transmission and reflection modes – Applications.

Unit Outcomes:

The students will be able to

- **Explain** how sound is propagated in buildings
- **Analyze** acoustic properties of typically used materials in buildings

Text books:

1. S.Balasubramanian, M.N.Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. Physics Laboratory Manual by Loyd D H, Cengage learning, 4Th International Edition 2014.
3. Et.Al. Engineering Physics Lab Manual by Madhusudhana Rao, SCITECH PUBLICATIONS (INDIA) PVT. LTD, 2015.
4. Practical Physics by K.Venugopalan (Author), Vimal Saraswat (Author), Himanshu Publications (1 January 2018)

References:

1. Physics Laboratory Experiments, by Jerry Wilson (Author), Cecilia A. Hernandez-Hall (Author), Brooks/cole; 7th edition (11 June 2009)
2. Lab manual Physics, R Rangarajan, R P Manchanda, R K Gupta, Rajesh Kumar Neena Sinha- New Saraswati House
3. Practical Physics by Kumar P. R. Sasi, Prentice-Hall of India Pvt.Ltd

Weblink:

1. http://vlab.amrita.edu/index.php - Virtual Labs, Amrita University.

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Course Title	OPEN ELECTIVE- 1 BASICS OF ELECTRICAL, MAGNETIC AND OPTOELECTRONIC MATERIALS				B. Tech.		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
180E2607	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		3	0	0	3	30	70	100
					End Exam Duration: 3Hrs		

COURSE OBJECTIVES:

1.Students will be able to understand the fundamental concepts and applications of electrical, magnetic and optical properties of materials.
2.Apply a multi-disciplinary approach to plan, design, identify and address future needs of all the conventional and novel materials utilizing their properties for the society.

COURSE OUTCOMES: Upon completion of this course, the student will be able to:

CO1	**Obtain** knowledge about the electrical, magnetic and optoelectronic materials, their properties and applications
CO2	Successfully **apply** advanced concepts of materials engineering for the design, development and analysis of materials and devices.
CO3	**Develop** novel materials from the fundamental understanding of materials and apply them to societal needs.
CO4	**Analyze** the properties of superconductors.
CO5	**Identifies** the Engineering applications of electrical, magnetic and optoelectronic materials.

Unit – I: Electrical Materials

Introduction to electrical conduction–Dielectric constants – dielectric loss, dielectric breakdown, piezoelectricity and pyroelectricity.

Unit – II: Magnetic Materials

Introduction to dia, para, ferro, antiferro and ferri magnetism –Hysteresis loop–hard and soft magnetic materials- applications

Unit – III: Semiconducting Materials

Introduction to semiconducting materials – concept of doping – working principle of p-n junction diode, LED, Photo diode– solar cell – applications.

Unit – IV: Superconducting

Introduction to superconductors-Properties-Meissner effect-Type-1 &Ttype-II superconductors – BCS theory- high critical temperature (Tc)-applications.

Unit – V: Optoelectronic Materials

Introduction to Laser Principles – ruby, CO_2 lasers – applications of optoelectronic materials – introduction to optical fibers – light propagation –Fiber optic sensors- applications.

Text Books:

1. C. Kittel, Introduction to Solid State Physics, John Wiley and Sons, 7th edition,New Delhi, (2004).
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company

Reference Books:

1. V. Raghavan, Materials Science and Engineering, Prentice Hall of India, 5th edition, New Delhi, (2013).
2. B. G. Yacobi, Semiconductor Materials: An Introduction to Basic Principles, Springer, 1st edition, New York, (2013).
3. S. Kasap and P. Capper (eds.), Handbook of Electronic and Photonic Materials, Springer, New York, (2007).

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KADAPA - 516 003. (A.P.)

Course Title	OPEN ELECTIVE- 2 ENGINEERING MATERIALS				B. Tech.			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
180E2602	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		3	0	0	3	30	70	100
					End Exam Duration: 3Hrs			

COURSE OBJECTIVES:

1.This introductory course is aimed to obtain basic exposure to the concepts of crystalline solids, its imperfections and basics of various advance engineering materials finding wide spread application in several industries.
2.Describe the process that is used to produce glass-ceramics.
3.To enlighten the periodic arrangement of atoms in crystals to provide fundamentals related to structural analysis through powder diffraction method.
4.Understanding these material systems are vital for investigating the defects and their nature on these classes of materials.

Course Outcomes: Upon completion of the course, the student will be able to:	
CO1	**Classify** various crystal systems.
CO2	**Explain** the applications of magnetic materials.
CO3	**Analyze** the various metallurgical factors influencing the performance of materials for different Structural engineering applications.
CO4	**Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics.
CO5	**Identify** applications of semiconductors in electronic devices .

Unit –I: Structure of Metals

Introduction-Different types of bonding in solids – Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC .

Unit– II: Magnetic Materials

Introduction to magnetic materials - Classification of magnetic materials: Dia, Para & Ferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis loop– Soft and Hard magnetic materials.

Unit– III: Ceramics

Introduction-Types and applications of ceramics- Glasses - Glass-Ceramics - Clay Products - Refractories - Abrasives Cements - Advanced Ceramics - Materials of Importance—Piezoelectric Ceramics

Unit –IV: Dielectric Materials

Introduction to Dielectrics-Electric polarization- Dielectric polarizability, Susceptibility and Dielectric constant-Types of polarizations(Qualitative)–Frequency dependence of polarization-Lorentz(internal) field- Classius-Mosotti equation- Applications of Dielectrics.

Unit –V: Electrical Properties of materials

Electrical conduction: - Ohm's Law - Electrical Conductivity- Electronic and Ionic Conduction - Energy Band Structures in Solids.

Semiconductivity:- Intrinsic Semiconductor - Extrinsic Semiconductor - The Temperature Dependence of Carrier Concentration - Hall Effect - Applications

Text Books:

1. Callister's Materials Science and Engineering: Wiley, Second Edition, (2018)
2. V. Raghavan, Materials Science and Engineering, Prentice Hall of India, 5th edition (2013).
3. G.E. Dieter, Mechanical Metallurgy, Mc-Graw Hill, 3rd edition (2013).

Reference Books:

1. L. H. Van Vlack, Elements of Materials Science and Engineering, Addison Wesley, 6th edition (1989).
2. I. J. Polmear, Light Alloys: Metallurgy of the Light Metals, Wiley, 3rd edition (1995).
3. V. Raghavan, Physical Metallurgy: Principles and Practice, PHI Learning Private Limited, 2nd edition (2006).

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Course Title	OPEN ELECTIVE – 3 PHYSICS OF RENEWABLE ENERGY				B. Tech.		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
180E2612	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		3	0	0	3	30	70	100
					End Exam Duration: 3Hrs		

COURSE OBJECTIVES:

1. A top priority for developing renewable energy in India is to boost the economy, encourage the development of energy security, and reduce carbon emissions.

2. Promote sustainable development and promote economic integration.

3. Ensure that any energy sector products that come into use do so with minimal impact on the environment.

4. Take every step to ensure that energy generation, conversion, and use are cost-competitive.

COURSE OUTCOMES: Upon completion of the course, the student will be able to:

CO1	**Understand** the energy resources.
CO2	**Apply** the Solar energy.
CO3	**Idealized** wind turbine
CO4	**Underground** heat – Micro hydro plants.
CO5	**Classify** the different types of energy resources.

UNIT I: Bio diversity conception individuals

Introduction to renewable energy– Biogas cogeneration – Wood as a source of energy – Energy crops – Bio diesel – Fuel from plantation – Ethanol – Synthesis fuels.

UNIT II: Solar energy

Solar thermal: Solar collectors – Hot water from Sun – Cooling with the Sun – Solar drying – Air collectors – Solar thermal power plants.

Solar electric: Photo voltaic effect – The heart of a PV array – The solar cell – Solar energy as part of sustainable development.

UNIT III: Wind Energy

Power in the wind: Aerodynamics principles of wind turbines – Power available in the wind – Rotor efficiency – Factors affecting wind power – Impact of tower height – Wind turbines sitting – Idealized wind turbine – Power curve – Speed control for maximum power.

UNIT IV: Hydro-Energy

Introduction -Water power – Ocean wave and tidal energies – Hydro power nature conservation – Underground heat – Micro hydro plants.

UNIT V: Geothermal Energy

Introduction-Geothermal Resource -Mining Thermal Energy From a Hot Dry Rock-Geothermal Heat Pumps-Active Volcanoes, Plate Tectonics, and the "Ring of Fire".

Text books:

1. Hand book of renewable energy technology -A.F.Zobba and R.Bansal, World scientific publications.
2. Renewable energy: The facts - Dieter Scirfried and Walter Witzel. Earth scan publications for sustainable future.

Reference books:

3. http://www.law.du.edu/index.php/the-renewable-energy-reader/6-geothermal

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Course Title	OPEN ELECTIVE - 4 FUNDAMENTALS OF QUANTUM COMPUTATION AND NANO PHOTONICS					B. Tech.		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
180E2607	BSC	L	T	P	C	Continuous Internal Assessment	End lab Exams	Total
		3	0	0	3	30	70	100
						End Exam Duration: 3Hrs		

COURSE OBJECTIVES:

1. This course outlines physically the intuitive concepts of quantum computation and nanophotonics using the concept of optical near-fields.
2.Physics of information processing; quantum error correction; quantum communication, Optical near-field is an electromagnetic field that mediates the interaction between nanometric materials used for the realization of novel photonic devices, fabrication techniques, and systems.
3. Prior knowledge of quantum mechanics and photonics is helpful.

Course Outcomes: Upon completion of the course, the student will be able to:

CO1	**Explain** the concepts of Quantum mechanics.
CO2	**Understanding** the basic concepts of quantum computation.
CO3	**Identify** the different implementations of quantum computers.
CO4	**Analyze** the nanophotonics and its true nature
CO5	**Classify** the Interconnections for nanophotonics

UNIT –I: Quantum Mechanics

Introduction to Matter Waves - de Broglie Hypothesis - Heisenberg Uncertainty Principle - Schrodinger's time independent wave equation - Significance of wave function.

UNIT –II: Quantum Computing

Basic concepts of quantum mechanics – Stern - Gerlach Experiment - Qubits – Measurements – Gates - Quantum no-cloning and Teleportation.

UNIT -III: Error Correction and Implementations

Quantum Error-Correction - three-qubit bit flip code - five-qubit code - General properties of quantum error-correction.
First Experimental Implementations - Quantum optics implementations -NMR quantum information processing.

UNIT -IV: Nanophotonics

Photons and Electrons: Similarities and Differences - Confinement – Propagation-free space, Forbidden Zone: Tunneling.

UNIT – V: Nanophotonic systems

Nanotechnology- Photonics - Nanophotonics - Optical Nanomaterials - Nanoparticle Coatings - Sunscreen Nanoparticles - Self-Cleaning Glass - Fluorescent Quantum Dots – Nanobarcodes.

Text Books:

1. Quantum Computing Basics and Concepts by S. M. Girvin - arXiv , 2013
2. *Principles of Nanophotonics by* Motoichi Ohtsu, Kiyoshi Kobayashi, Tadashi Kawazoe, Takashi Yatsui and Makoto Naru -New York, USA: CRC Press-Taylor & Francis Group, 2008.
3. Paras. N. Prasad, Nanophotonics. New Jersey, USA:John Wiley & Sons Inc.,2004

Reference Books:

1. Quantum Computing by John Watrous - University of Calgary , 2006
2. Basic Concepts in Quantum Computing by Artur Ekert, Patrick Hayden, Hitoshi Inamori – ar Xiv , 2000
3. An Introduction to Quantum Computing for Non-Physicists" Eleanor Rieffel FX Palo Alto Labratory and Wolfgang Polak Consultant FX Palo Alto Laboratory.

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Certification Course

Nanoscience & Technology and Applications

Hours: 30

Course Objectives:

To enable the students to understand the concepts of the nanotechnology such as different parameters, properties and preparation techniques also improve their knowledge regarding this technology and make them familiarize the importance of this technology in various fields.

Unit I: Introduction to Nanoscale materials

Introduction – scientific revolutions – Nanoscale – Surface area to volume ratio and Size effect – *Special properties of Nanomaterials* – electrical, magnetic and mechanical properties.

Unit II: Nanostructured Materials

Definition of a nano system – classification based on nanomaterials- nanopowders, nanoporous materials, nanodust, nanowires and nanotube – Classification based on dimensions -0D, 1D, 2D and 3D.

Unit III: Fabrication Methods

Synthesis of nanomaterials *Top-down:* Ball Milling – principle – construction and working and applications – *Bottom-up:* Chemical Vapour Deposition – Sol-Gel method and Self Assembly – principle –construction and working.

Unit IV: Applications of Nanotechnology

Industrial Applications: Need of the nanotechnology in Industries – Energy – pollution control – data storage – Cosmetics and pigments – Sensors.

Biomedical Applications: Need of the nanotechnology in biomedical field – Nano cosmetics – Drug delivery and gene delivery by nanorobots – cell manipulation. Case studies: Nanorobots.

Unit V: Carbon Nano Tubes

Carbon nano tubes – properties – thermal, electrical and mechanical properties – preparation by Carbon Arc method – Electrical, molecular devices and biomedical applications of CNTs.

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Course Outcomes: Students will be able to

- Illustrate the concepts of the nanotechnology and nano science and electrical, magnetic and mechanical properties of the nanomaterials.
- Classify the different types of the nanostructure materials also based on the dimensions.
- Demonstrate the different preparation techniques such as Top-down and Bottom-up approaches.
- Apply the ideas of this new and efficient technology in different fields like industrial and biomedical fields
- Explain the different concept of carbon nano tubes their peculiar properties, preparation and applications.

Text Books:

1. Text book of Nanoscience and Nanotechnology, B S Maruty, P. Shankar, Baldev Raj, B B Rath & James Murday by University Press (India) Private Limited (2012).
2. Nanoscience and Nanotechnology in Engineering, Vijay K Varadan by worlds Scientific publications (2010).

Reference Books:

1. Introduction to Nanoscience and Nanotechnology, K K Chattopadhyay and A N Benarjee by PHI Learning Prv. Ltd. (2014).
2. Nanotechnology, Gregory Timp by Springer (2005)
3. Introduction to Nanotechnology, Charles p Poole Jr, Frank J Owens by A Wiley Interscience Publications (2003).
4. "Nanotribiology" Critical Assessment and Research Needs, Stephen M. Hsu and Z. Charles Ying by Springer (2006)

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Engineering Physics

Bridge Course

Module	LectureRequired
1.Mechanics	01
2.Mechanical Properties of Solids and Fluids	02
3.Waves and Oscillations	02
4.Electricity and Magnetism	02
5.Electromagnetic Signal	02
6.Optics	01
7.Semiconductor Electronics	02
8.Modern Physics	01
9.Atomic and Nuclear Physics	02

HOD/H&S

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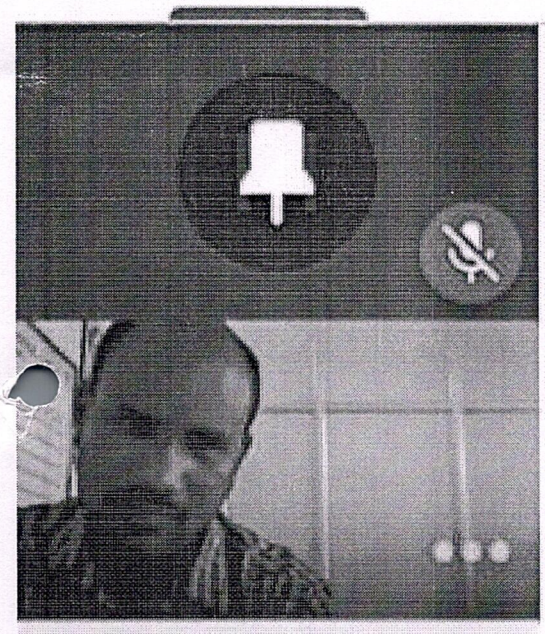

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G C Venkata Subbaiah >

Dr.K.Venugopal Reddy >

VRK Murthy >

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ESTD 1980

HOD H&S <hod.hs@ksrmce.ac.in>

Fwd: Prof. K. Thyagarajan - Approval of the framed syllabus of EP & AP of R20 regulations- Reg.

1 message

G C Venkata Subbaiah <gcvsubbaiah@ksrmce.ac.in> Sat, Jan 16, 2021 at 2:00 PM
To: hod.hs@ksrmce.ac.in

---------- Forwarded message ---------
From: **Prof.K.Thyagarajan** <ktrjntu@gmail.com>
Date: Sat, Jan 16, 2021 at 1:25 PM
Subject: Prof. K. Thyagarajan - Approval of the framed syllabus of EP & AP of R20 regulations- Reg.
To: <gcvsubbaiah@ksrmce.ac.in>

Sir

I am herewith approve the framed syllabus of Engineering Physics & Applied Physics of R20 regulations.

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Dr.K.Thyagarajan,
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JNTUA College of Engineering,
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