



Koneru Lakshmaiah Education Foundation

(Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Department of Physics

A.Y.2023-24

Course Code	Course Title	S. No	CO. No	Description of the course Outcome
23UC5201	Professional Communication Skills	1	CO1	Develop and demonstrate principles of listening,
		2	CO2	Demonstrate different types of personal and professional.
		3	CO3	Apply the concepts of Mathematical Principles to solve.
		4	CO4	Apply the concepts and using Logical thinking to solve.
23NS5102	Physics of Nanotechnology	5	CO1	Mechanics to solve the problems related to the
		6	CO2	Understand the fundamental concepts of wave optics, electromagnetic waves, interference and polarization of light.
		7	CO3	Apply the spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.
		8	CO4	Apply the knowledge of crystal structures and understand the electrical properties of semiconductors.
23NS5103	Chemistry of Nanotechnology	9	CO1	Understanding the basic Classification and Nomenclature of Nanomaterials.
		10	CO2	Demonstrate of different types of chemical method to Synthesis of Nanomaterials.
		11	CO3	Understanding the concepts of Structure and Morphology of Nanoparticles.
		12	CO4	Demonstrate the Novel Properties of Nanomaterials.
	Synthes	13	CO1	Apply the principles of different Physical and chemical

23NS5104	is and characterization of Nano Materials-1			routes to synthesis as per the required application and properties.
		14	CO2	Apply the knowledge of structural characterization methods to analyse the performance of materials for required applications.
		15	CO3	Apply the knowledge of spectroscopic characterization methods to analyze the performance of materials for required applications.
		16	CO4	Apply the knowledge of surface and thermal characterization methods to analyze the performance of materials for required applications.
		17	CO5	Apply the knowledge of synthesis and characterization of nanomaterials to perform experiments and analyze the samples.
23NS51E1	Elective 1 Biology of Nanotechnology	18	CO1	Understand the basics of Biotechnology.
		19	CO2	Understand the interaction between biomolecules and nanoparticle surface and its applications.
		20	CO3	Optimize the synthesis of Biocompatibility of Nanomaterials.
		21	CO4	Identify the risk assessments involved bio nanomaterial.
23NS51E2	Bio Chemistry	22	CO1	To acquire basic knowledge on nucleic acids, amino acids.
		23	CO2	To acquire knowledge on carbohydrates, lipids and proteins.
		24	CO3	Analyze different types of DNA based Nanostructures.
		25	CO4	To know about their metabolisms, energy production, carbohydrates, lipids and proteins.
23IE5201	Essentials of Research Design	26	CO1	Illustrate Research objects, steps involved in research and articulate appropriate Research Questions.
		27	CO2	Perform Literature Review in a Scholarly style and apply appropriate methods for Data collection.
		28	CO3	Represent the data in tabular/Graphical form and prepare data for analysis.
		29	CO4	Perform statistical modelling and analysis to optimize the data, prepare the data for publishing.
		30	CO1	Understand to synthesis of NPs using Sputtering processes.

23NS5205	Synthesis and Characterization of Nanomaterials -2	31	CO2	Demonstrate the defects of materials using different characterization techniques.
		32	CO3	Demonstrate the Magnetic and electrical characterization of NPs.
		33	CO4	Fabricating biomedical NPs and biomedical materials characterizations.
		34	CO5	Fabricating the different types of NPs and analyzing them.
23NS5206	Emerging applications of nanotechnology	35	CO1	Understanding the principles of Nanotechnology and explaining its applications in the biomedical field with the intersection of nanotechnology and biomedicine.
		36	CO2	Describe the Nanotechnology in Agriculture through precision and conventional farming methods and current developments in Nano-based agriculture systems.
		37	CO3	Evaluate the impact of Nanotechnology on food processing, food quality, and ethical implications on food products.
		38	CO4	Apply Nanoscale techniques to demonstrate the nanomaterial-biomolecular interactions and toxicity associated with using nanomaterials in biological systems.
23NS5207	Micro and Nano Electronics Devices	39	CO1	Understand the Basic Electronic devices and nano electronic devices, Mechanical Molecular Nano robotics Nano devices and Nano computers: Theoretical Models.
		40	CO2	Understand the Molecular scale electronics -Molecular materials for electronics – Carbon materials: Fullerene and CNTs.
		41	CO3	Understand the Micro and Nano electrical Systems: - Overview.
		42	CO4	Understand the Future Nanosystems -Nano machines, nano robots, electronics based on CNT, molecular Electronics.
	Elective – 2	43	CO1	Apply in-depth knowledge in the concepts of magnetism at both micro and nanoscale.
		44	CO2	Apply good knowledge in nanomagnetism and the

23NS52E3	Nanomagnetic Materials and Devices			advanced tools to study.
		45	CO3	Applying the various imaging techniques to study the magnetic behaviors.
		46	CO4	Identify and apply the suitable applications of the magnetic materials based on the functional Properties in nanomagnetic in data storage and biomedicine.
23NS52E4	Societal impacts of nanotechnology	47	CO1	Understand the societal impacts of nanotechnology
		48	CO2	Apply the economic impact of nanotechnology
		49	CO3	Discuss the ethics and laws related to nanotechnology
		50	CO4	Discuss the societal impacts of nanotechnology
OENS0001	Open Elective – 1 Material Science and Engineering	51	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.
		52	CO2	Understands spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.
		53	CO3	Understands role of molecular level vibrations in determining thermal properties of materials, heat treatment methods for changing the microstructure of materials and micro and macro level responses of materials subjected to load, for identification of materials having specific engineering applications.
		54	CO4	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.
23CC5201	Value Added Course			
23NS6108	Nano Photonics	55	CO1	Acquire the knowledge in optical Sensors - Mathematical Methods in Nanophotonics
		56	CO2	Evaluate fundamental concepts of physics which is necessary for Plasmonic biosensors - nanofabrication.
		57	CO3	Understand the basic principles of Nano lasers Sensors and Nanophotonics and its importance
		58	CO4	Understand the basic principles of energy transfer and medical sensor

23NS6109	Advanced nanomaterials	59	CO1	Gain in-depth knowledge in the concepts of magnetism at nanoscale.
		60	CO2	Gain good knowledge in Thermoelectric Materials and the advanced tools to study.
		61	CO3	Understanding the various one dimensional semiconductors behaviours.
		62	CO4	Understanding the structure properties of polymeric nanomaterials and applications.
23NS6110	Advanced Nanotechnology	63	CO1	Apply the basic concepts of energy conversion systems.
		64	CO2	Appraise the working of fuel cells current status and future trends
		65	CO3	Apply the knowledge of photovoltaic cells and energy conversion systems to improve their performance.
		66	CO4	Apply the knowledge of photovoltaic systems to understand the working of Solar cells.
23IE6104	Term Paper	67	CO1	Discovery of new insights, theories, or empirical findings that advance the existing knowledge base

23NS61E5	Elective – 3 Nanotechnology for Renewable Energy Materials	68	CO1	Apply the basic concepts of energy conversion systems.
		69	CO2	Appraise the working of fuel cells current status and future trends
		70	CO3	Apply the knowledge of photovoltaic cells and energy conversion systems to improve their performance.
		71	CO4	Apply the knowledge of photovoltaic systems to understand the working of Solar cells.
23NS61E6	Nanotechnology in Health Care	72	CO1	Understand the recent advancements in nano medicine.
		73	CO2	learn developments in nanostructured materials used for medical implants
		74	CO3	learn about nano diagnostics and understand the harmful effects of nanoparticles.
		75	CO4	Understand need of nanotechnology in health care
	Open Elective	76	CO1	- Understanding the basic concepts, Background, scientific revolutions of nanoscience and technology and understanding multifunction materials
		77	CO2	Apply the principles of different chemical routes to synthesis as per the required application and

OENS0002	e – 2			properties.
	Experimental Physics	78	CO3	- Understanding the basic difference between nano and bulk materials properties.
		79	CO4	Apply the knowledge of structural characterization methods to analyse the performance of materials for required applications.
23NS6121	Flexi Core Course Nano electronics	80	CO1	Understanding of the principles, limitations, and applications of nano electronics.
		81	CO2	Understanding of the nano scale effects, techniques for nanoscale transistor fabrication, industrial CMOS technology, and non-classical elements of nano MOSFETs.
		82	CO3	Understanding of the introduction to nanostructures, the fabrication and patterning techniques used to create nanostructures, and the characterization techniques.
		83	CO4	Understanding of nano sensors, nano actuators, memory devices, photovoltaic cells, and their applications in communication, industry, commercial settings, agriculture, biomedical fields, and the Internet of Things (IoT).
23NS6122	Artificial Intelligence Integration with Nanotechnology	84	CO1	Gain the in-depth knowledge in the concepts Artificial Intelligence, Machine Learning, and Deep Learning
		85	CO2	Gain and apply good knowledge of artificial intelligence in the nanotechnology.
		86	CO3	Applying the artificial intelligence in nanoscale simulations
		87	CO4	Apply the knowledge of artificial intelligence in Nano-Computing and High-Performance Computing.
23IE6205	Dissertation	88	CO5	Discovery of new insights, theories, or empirical findings that advance the existing knowledge base