Mandsaur University, Mandsaur

B.Tech. Electrical and Electronics Engineering (EVT)

Semester-VIII

L-0, T-0, P-20, C-10

EPEEE0900A Major Project-II

Course Objectives:

- Provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.
- Adapt students for latest developments and to handle independently new situations.
- Develop good presentation abilities in students.

Course Outcomes:

1. Understand the practical knowledge of project elements, their parameters and usage in industrial applications.

2. Understand methodologies and professional way of documentation and communication.

Content

- The focus of the Project-II is on preparing a working model or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write-up i.e. detail project report.

- The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis, market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan.

- Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system.

Subject Expert	Academic Coordinator	HoD	Appointed Senior Faculty by DoAA

Mandsaur University

B.Tech- Electrical & Electronics Engineering (EVT)
Semester-VIII

L-2 T-0 P-0 C-2

OEENG0201A Fundamental of Nano Technology

Course Objectives:

- To Learn about the basics of nanoscale science types of structures and nonmaterial and their devices
- To Understand nano dimensions and shape
- To Implement nanomaterials and its fabrication in synthesis
- To Analyze tools to observe nanoparticals and devices
- To Apply the application of Nano in Solar cells and data storage

Course Outcomes (COs)

1. Understand fundamentals of Nano science and Nano technology
2. Evaluate various Nano-structures
3. Analyze among Nonmaterial
4. Analyze Nannomaterials through toolkit
5. Create the Applications of Nano in various applications

Articulation Matrix

(Program Articulation Matrix is formed by the strength of correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	2	-	-	-	-	-	1	2	2	1
CO2	3	2	3	2	2	1	-	-	2	-	2	3	3	3	2
CO3	3	2	2	1	2	2	-	-	1	-	1	1	2	2	2
CO4	2	2	3	2	1	1	-	-	2	-	2	1	3	2	2
CO5	3	2	2	3	2	2	-	-	2	-	2	2	3	3	2

High-3 Medium-2 Low-1

Unit-I Introduction to Nanoscience and Nanotechnology **10 Hours**

History, background and interdisciplinary nature of nanoscience and nanotechnology, nanosized effects surface to volume ratio, examples of surface to volume ratio, atomic structure, Bohr atomic model, molecules and phases, introduction to classical physics and quantum mechanics, importance of nanoscale materials and their devices

Unit-II Different Classes of Nanomaterials **9 Hours**

Classification based on dimensionality-Quantum Dots, Wells and Wires- Carbon- based nanomaterials (Buckyballs, Nanotubes, Graphene), Metal based Nanomaterials (Nanogold, Nanosilver and Metal oxides), Nanocomposites, Nanopolymers, Nanoglasses, Nano ceramics, Biological nanomaterials.

Unit-III Synthesis of Nanomaterials **9 Hours**

Top down and bottom up nanofabrication. Chemical Methods: Metal Nanocrystals by Reduction –

Solvothermal Synthesis- Photochemical Synthesis, Chemical Vapor Deposition (CVD) -Metal Oxide Chemical Vapor Deposition (MOCVD).
Physical Methods: Ball Milling -Electrodeposition – Spray Pyrolysis – Flame Pyrolysis - DC/RF Magnetron Sputtering – Molecular Beam Epitaxy (MBE), Physical Vapor Deposition (PVD), Self Assembly.

Unit-IV Nonomaterials and Devices **9 Hours**

Toolkit to observe Nanos: Microscopy, Spectroscopy, Scanning Electron Microscope (SEM), Scanning probe microscopes(SPM)- Scanning Tunneling Microscope (STM) and Atomic Force Microscopy (AFM), X-Ray Diffraction, Ultraviolet-Visible (UV-Vis) Spectroscopy, Raman Spectroscopy.

Unit-V Nano Application **8 Hours**

Solar energy conversion and catalysis – Molecular electronics and printed electronics-nano-electronics nano-structured layers in thin film solar cells, Reduction of the cost of solar cells by nanotechnology, Attribute of Nano in Solar cell, fabrication of solar cells with TiO2 nanoparticles, Experimental setup: DSSC fabrication, Applications in displays and other devices, Nanomaterials for data storage, Photonics, Plasmonics, Chemical and biosensors - Nanomedicine and Nanobiotechnology.

Total: 45 Hours

Reference(s)

1. Edward L. Wolf, “Nanophysics and Nanotechnology – An Introduction to Modern Concepts in Nanoscience” Second Edition, John Wiley & Sons, 2006.
2. Nanotechnology – Basic Science & Emerging Technologies: 2002 by Michael Wilson, KamaliKannangara, Geoff Smith, Michelle Simmons, and BurkhardRaguse.
3. M. Reza Mozafari (2007) Nanomaterials and Nanosystems for Biomedical Applications.
4. Fundamentals of Nanotechnology: Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep Dutta (2nd edition)(CRC Press).
5. Nanotechnology: Principles & Practicals. Sulbha K. Kulkarni, Capital Publishing Co.New Delhi.
6. Nanomaterials: Synthesis, Properties & Applications. Edited by A.S. Edelstein & R.C.Commorata. Institute of Physics Publishing, Bristol & Philadelphia.
7. Introduction to Nanotechnology. C.P. Poole Jr. and F. J.Owens, Wiley Student Edition.
8. Nanoscience and Technology: Novel Structure and Phenomena. Ping and Sheng 10. Hand Book of Nanotechnology, Bhushan.

List of e-Learning Resources:

1. https://nptel.ac.in/courses/118102003
2. Coursera.org/learn/nanotechnology1

Subject Expert	**Academic Coordinator**	**HoD**	**Appointed Senior Faculty by DoAA**

Mandsaur University

B.Tech Electrical & Electronics Engineering
Semester-VIII

L-2 T-1 P-2 C-4

PCEEE1600A Advanced Power Electronics

Course Objectives:

- To define basics of inverters, functions performed by the different kind of single phase and three phase inverters.
- To understand the basic concepts of control techniques for inverters and switch mode inverter.
- To define the types and principle of operation of multilevel inverters.
- To develop the concepts about chopper circuits and analyze quadrant operations of the same.
- To define fundamental operating system of Switch mode power supplies and control of converters.

Course Outcomes:

1. Understand concepts of Inverter with its topologies of single & Three-phase inverters.
2. Apply different modes of operation of three-phase inverters and different effect on the operation of inverters.
3. Analyze multi-level inverters and also designing of different types of circuits of multi-level inverters.
4. Evaluate chopper circuits with the selection of practical choppers with multiphase choppers.
5. Create the operations, effects, control of convertor circuits for better performance.

Articulation Matrix

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CO2	2	1	2	-	-	1	1	-	-	-	-	-	2	2	-
CO3	1	1	2	-	-	-	-	-	-	-	-	-	2	2	-
CO4	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	1	2	-	-	1	-	-	-	-	-	-	-	2	1

High-3 Medium-2 Low-1

Unit-I **09 Hours**

Inverter principles, Inverter topologies for single phase and three phase inverters, Push pull, half bridge and full bridge single-phase inverters, Quasi square wave inverters, Three-phase six step and current controlled inverters, current source single& Three-phase inverters.

Unit-II **09 Hours**

Voltage and frequency control techniques for inverters. 120^{o} and 180^{o}mode of operation of three-phase inverters, basic concepts of switch mode inverter, PWM with bipolar and unipolar switching. Push Pull inverters, switch utilization, Effect ofblanking time, space vector modulation, phase sequence control, selective harmonicselimination techniques.

Unit-III **09 Hours**

Multi-level inverters, concept, advantages of multilevel inverters, types and principleof operation, Diode clamped multilevel inverter and cascaded multilevel inverters.

Unit- IV **09 Hours**

Principles and classification of chopper circuits, Analysis of practical choppers forsingle, two and four quadrant operation, Device selection, duty cycle range of practical choppers, Design consideration for RL and RLE loads, MultiphaseChoppers, thyristor choppers, Switching control circuits for chopper converters.

Unit-V **09 Hours**

Switch mode power supplies, buck. Boost and buck-boost converters, Control of DC-DCconverters, Continuous and discontinuous conduction mode, Effect of patristic elements, Converter comparison.

Total 45 Hours

PRACTICALS:

1. To study 3-Phase Thyristor converter circuits.
2. To study D C Chopper Circuits.
3. To study 3 Phase PWM & non PWM inverter.
4. To study 3-Phase Variable frequency Drive.
5. To study Speed control of DC motor.
6. To study Basic DC-DC Converters with MOSFET Switch.
7. To study Fly-back dc to dc converter with isolated and regulated output voltages.
8. To study a single phase PWM AC to DC converter.
9. To study 1-phase ASCI current source inverter.
10. To study Switching characteristics of MOSFET and IGBT.
11. To study ZVS and ZCS buck converter.
12. To study ZVS active clamped Forward Converter.

Total 75 Hours

Text Books:

1. N. Mohan, T. M. Undeland and W.P Robins, "Power Electronics Converters, Application and Design", third edition, John Wiley India 2003.
2. M. H. Rashid, "Power Electronics Circuits, Devices and Applications", third edition Prentice-Hall 2004.
3. L. Umanand, "Power Electronics Essentials and Applications", Wiley Indiab2009.
4. Joseph Vithayathil, "Power Electronics principle and Applications", Tata McGraw Hill 2010.
5. D.W. Hart, "Power Electronics", Tata McGraw Hill edition 2011.

Reference Books:

1. K. Thorborg, "Power electronics", Prentice Hall, UK 1988.
2. E. R. Hnatek, "Design of Solid-State Power Supplies", An Nostrand Reinhold New York 1989.
3. T. Kenjo, "Power Electronics for the Microprocessor Age", Oxford University Press New York 1990.
4. R. Bausiere, F. Labrique and G. Seguier, "Power Electronics Converters: DC-DCConversion", Springer-Verlag, 1993.

List of e-Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ee127/preview
2. https://ep.jhu.edu/courses/525727-advanced-power-electronics/

Subject Expert	**Academic Coordinator**	**HoD**	**Appointed Senior Faculty by DoAA**