MGSC – B.Sc. – Physics Curriculum 2024 OBE Pattern
SEMESTER 1 MINOR: PHM113 (T)
Minor Course: 2-Credits

Semester: 1 NEP-2020	**Course No.: 113**	**Course Category: Minor paper** **Course Code: PHM 113(T)** **Credits: 2** **Course Title: Mechanics, Basic analog Electronics.**

Course Objective

1. Gain proficiency in vector algebra and operations including scalar and vector products. Develop the ability to use vector differential operators: gradient, divergence, and curl, and understand their physical meanings. Apply vector integral calculus: compute line, surface, and volume integrals and utilize divergence, Green's, and Stokes' theorems in physical contexts.
2. Understand the concept of rectification and its significance in converting AC to DC. Learn the operation and characteristics of various rectifier circuits (half-wave, full-wave, and bridge rectifier).Measure and interpret parameters like output voltage, ripple factor, and voltage regulation in rectifier experiments.

Transistor Course Objective

Gain a fundamental understanding of transistor types (such as BJT) their structure, and operational principles.
Study transistor characteristics in different configurations (such as CE, CB, and CC for BJT)
Learn the importance of biasing and compensation techniques in amplifier circuits.
Develop the ability to design and analyse amplifier circuits using transistors.

Course Outcomes: On successful completion of the course, learners will be able to

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CO1	Understand scalars, vectors, product of vectors and their applications, Learning the concept of Gradient, the Divergence theorem. Gauss's law, The curl and Stoke's theorem.	Remember Understand
CO2	Remember basic concepts of semiconductor diode, design rectifier circuits, study important aspects of rectifier circuits, and know about the Characteristics of transistor, load line analysis, operating point, cut off and saturation points.	Remember Understand

Syllabus:

Unit Contents	Lectures (Hours)
Unit 1: Vector Algebra. Introduction, Applications of Vector Multiplication, Triple Scalar Product, Triple Vector Product, Differentiation of Vectors, Fields, Directional Derivative, Gradient, Some other Expressions involving del , Green's Theorem in the plane, The Divergence and the Divergence theorem. Gauss's law, The curl and Stoke's theorem. **Unit 2: Electronics.** **1.Diode: load line analysis of diode circuit** Rectifier: Full wave rectifier circuits, Mathematical analysis of full wave rectifier circuit, Important aspects of rectifier circuits, comparison of half wave and full wave rectifier, Bridge rectifier.	15 15

2. Transistor. Transistor, Naming the transistor terminals, some facts about the transistor, transistor action, Transistor symbols, transistor as an amplifier, Transistor connections, CB connection, Characteristics of CB connection, CE connection, Measurement of leakage current, characteristics of CE connection, CC connection, comparison of transistor connections, commonly used transistor connection, Transistor as an amplifier in CE arrangement, Transistor load line analysis, operating amplifier, cut off and saturation points. Practical way of drawing CE circuit, output from transistor amplifier, Performance of transistor cut off and saturation points.	

Text Books/Reference books:

For unit 1:

1.Mathematical methods in Physical Sciences By M.L. Boas , chapter 6 , articles 1 to 7 and 9 to 11 , 3rd edition ,2006, John Willey & Sons.

2. Mathematical Methods for Physicist, Arfken, Weber and Harris 7th Edition, 2012, Elsevier.

For unit 2:

1. Fundamentals of Electronics by Anokh Singh Chaprer-5, articles-5.1 to 5.9., 4 th Edition 1986, Khanna Publishers.

2, Principles of Electronics V. K. Mehta and Rohit Mehta, Chapter-8, 8.1 to 8.27. 34th edition, 2017, S. Chand publication.

3. Electronics devices and circuits – An introduction Allen Mottershead Ch-2, article 2.1 PHI learning privet Ltd. , 2011

4. Basic Electronics and Linear Circuits, N.N, Bhargava, D.C. Kulshrestha and S.C.Gupta, 2nd Edition, 2017, NITTR, Chandigarh.