

**M.G. Science Institute – B.Sc. – Physics Curriculum OBE Pattern**

**Semester 6 Major**  
**Course- 362T**  
**(Major Course – 4 Credits)**

<b>Semester: 6</b>	<b>Course No.: 362(T)</b>	<b>Course Code:</b> PHM 362(T) <b>Course Title:</b> Electromagnetics- Nuclear Physics- Electronics
<b>Credits: 4</b>	1 Session = 1 hour	<b>Course Category: Major Paper</b>

**Course Objective:**

To understand the production and propagation of electromagnetic radiation and also the effect of retardation on electromagnetic radiation.

The detailed study of binding energy using liquid drop model to understand the stability of nuclear structure.

The basic knowledge of transistor circuits is used to analyze and design the amplifier and oscillator circuits.

To use Boolean laws and Karnaugh maps to simplify logic expressions and design digital circuits including various flip-flop circuits.

**Outcomes:** On successful completion of the course the learner will be able to

<b>CO</b>	<b>COURSE OUTCOMES</b>	<b>Bloom's Verb</b>
<b>CO-1</b>	Understand the concepts of retardation and production of electromagnetic waves by an accelerating charge particle. Apply these concepts for analyzing oscillating dipole working as a simple antenna.	<b>Understand Analyze Apply</b>
<b>CO-2</b>	Understand the concept of binding energy of nucleus by comparing with structure of liquid drop. Calculation of different energy terms associated with binding energy can be done. By applying these all concepts analysis of stability of any fissionable nucleus can be done.	<b>Understand Analyze Apply</b>
<b>CO-3</b>	Understand and apply principles of analog electronics to study the negative feedback amplifier and transistor oscillator circuits	<b>Understand Analyze Apply</b>
<b>CO-4</b>	Understand the basic principles of Boolean laws for different digital circuits. Apply these laws to plot Karnaugh map for different logic circuits Analyze and design combinational and sequential digital circuits.	<b>Understand Analyze Apply</b>

<b>Unit No.</b>	<b>Unit Contents</b>	<b>Sessions Allotted</b>
<b>1</b>	<b>Electromagnetics</b> <b>Electromagnetic Radiation:</b> Retarded Potential, Radiation from an oscillating dipole, Linear Antenna, Lienard-Wiechert Potentials, Potentials for a charge in uniform motion – Lorentz formula, Fields of an accelerated charge, Radiation from an acceleration charged particle at low velocity, Radiation when the velocity and acceleration of the particles are collinear, Radiation from a charged particle moving in a circular orbit, Elective quadrupole radiation.	<b>15 Hours</b>
<b>2</b>	<b>Liquid drop model of nucleus</b> <b>The liquid drop model of the nucleus:</b> Introduction, Binding energies of nuclei: plot of B/A against A., Weizsacher's semi empirical mass formula Mass parabolas: prediction of stability against Beta decay for members of an isobaric family, Stability limits against spontaneous fission, Barrier penetration - decay probabilities for spontaneous fission, Nucleon emission.	<b>15 Hours</b>

## M.G. Science Institute – B.Sc. – Physics Curriculum OBE Pattern

<b>3</b>	<b>Electronics</b> <b>Negative feedback in Transistor and Transistor Oscillators</b> Negative Feedback in transistor amplifier: General theory of feedback, reasons for negative feedback, loop gain, types of negative feedback in transistor circuits, <b>Transistor Oscillators:</b> Introduction, Effect of positive feedback, requirements for oscillations, the phase shift oscillator, Wien bridge oscillator, LC oscillators, Colpitt and Hartley oscillators with analysis.	<b>15 Hours</b>
<b>4</b>	<b>Circuit analysis, design and Flip flop</b> Boolean laws and theorems, sum of products method, truth table to Karnaugh map, pairs, quads and octets, Karnaugh simplification, don't care conditions, product of sums method, product of sums simplification, Exclusive OR gate. <b>Flip flop</b> RS flip flop, clocked RS flip flop, D flip flop, Edged triggered D flip flop, JK flip flop, JK master slave flip flop	<b>15 Hours</b>

### Unit-1 Electromagnetics

**Text Book:** Electromagnetics by B. B. Laud, 2nd Edition, Wiley Eastern Ltd.  
Chapter9-Article Nos.: 9.1 – 9.10

#### Reference books:

1. Introduction to Electrodynamics by David J. Griffiths; Cambridge University Press, 4<sup>th</sup> edition, 2013.
2. Classical electromagnetism by H. C. Verma; 1<sup>st</sup> edition Bharat Bhavan Publishers and Distributers.
3. Electrodynamics by Gupta, Kumar and Singh, 22<sup>nd</sup> edition, 2014 Pragati Prakashan.

### Unit-2 Nuclear Physics

**Text Book:** Nuclear Physics - An Introduction by S.B. Patel, New Age International.  
Chapter-4-Article Nos.: 4.IV - 1 to 4.IV - 4, Chapter-5 Article nos-5.1 to 5.7

#### Reference Books:

1. Introduction to Nuclear Physics by .Enge, Addison Wesley
2. Nuclear Physics by D. C. Tayal, Himalaya Publisher Nuclear Physics by Irvin Kaplan
3. Modern Physics by Kenneth Krane, John Wiley and sons.
4. Nuclear Physics by Irvin Kaplan

### Unit-3 Electronics

**Text Book:** Electronic Devices and circuits – An introduction by Allen Mottershed  
Chapter-17-Article Nos.: 17.1 to 17.4, Chapter-18-Article Nos 18.1 to 18.6  
Hand Book of Electronics by Gupta and Kumar chapter 22- Article Nos.: 22.4, 22.5

### Unit-4 Electronics

**Text Book:** Digital Principles and Applications by Malvino and Leach, Mcgraw Hill International editions, International edition 1986 chapter-2 Article Nos.: 2.1 - 2.8,chapter-3 -Article no.: 3.7; Chapter8: Article no. 8.1 to 8.4, 8.6, 8.7.  
Hand Book of Electronics by Gupta and Kumar