Syllabus for Master of Science

Physics

Subject Code: 02PY0410

Subject Name: Electronics-I

M.Sc. Year-I, Sem-I

Objective: To examine various eletronic devices and basic concepts of digital electronics.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, post graduate will be able to

- Interpret the basics of semiconductor physics and its importance in various optoelectronic devices.
- Apply knowledge of physics as a basic science in solving real life and scientific problems
- Apply knowledge of physics to become successful in national level examinations like NET, SLAT, GATE etc.
- Engage in research in the field of pure and applied physics and involve in life-long learning

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva (V)	Term work (TW)	
4	0	0	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	**Basics of Semiconductor Physics:** Valence and Conduction band basics, Concept of Metals, Free carriers in Semiconductor, Types of Semiconductors, Band Model, Materials Classification based on Band-gap, Fermi level, Basics of p-n junction, Diode Current Equation, Effects of Temperature on Semiconductor Parameters	**14**
2	**Electronic Devices and its applications:** Simple p-n junction diode, Zener diode, Solar cell, Forward bias and Reverse bias operations, Breakdown Mechanisms, p-n junction diode as Rectifier, Zener diode as Regulator.	**12**
3	**Opto-Electronic Devices:** Light Emitting Diode (LED), Liquid Crystal Display (LCD), Light Dependent Resistor (LDR), Photo diode, PIN photo diode, Photo transistor	**10**
4	**Digital Electronics-I:** Number systems (Binary, Hexadecimal), Logic gates, Introduction to Logical families (RTL, DTL and TTL)	**12**
5	**Digital Electronics-II:** Theorem of Boolean algebra, De Morgan's theorem, Karnaugh map specifications, Half and Full adder, (RS, JK, Master slave) Flip Flop, Counters	**12**
	Total Hours	**60**

References:

1. Basics Electronics and circuits theory by R. Boylestad 8th edition, Pearson publication (2002).
2. Basics of Electronics by V.K. Maheta, S. Chand Publications.
3. Fundamentals of Digital Circuits by Anand Kumar, Prentice-Hall Of India Pvt. Limited (2003)
4. Electronic Devices and Circuits by Salivahanan, Tata McGraw-Hill Education, (1998)

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.