

Name of the Course: Physics Major Course 13
MJ - 13: Electronics (2 Credits)

Sr. No.	Heading	Particulars
1	Description the course (Including but Not limited to)	: Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	Vertical	: Major /Minor/Open Electives /Skill Enhancement / Ability Enhancement/Indian Knowledge System
3	Type	: Theory
4	Credits	: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted	: 30 Hours
6	Marks Allotted	: 50 Marks
7	Course Objectives (CO): The students are expected to	
	CO 1.	explain basics of semiconductor devices JFET, MOSFET, SCR and UJT, its characteristics, biasing, specification parameters and its applications.
	CO 2.	understand basics of OP-AMP, its different parameters and applications.
	CO 3.	understand basics concepts of transistor multivibrators, timing pulse generation 555 timer and its applications.
	CO 4.	explain regulated power supplies its characteristics and its types.
	CO 5.	demonstrate quantitative problem-solving skills in all the topics covered.
8	Course Outcomes (OC): After successful completion of this course, the students will be able to	
	OC 1.	gain the basic knowledge of semiconductor devices and its applications.
	OC 2.	comprehend knowledge about JFET, MOSFET, SCR and UJT its Biasing, parameters and its applications.
	OC 3.	understand basics of OPAMP, its parameters and its applications.
	OC 4.	comprehend knowledge of transistorized multivibrators, multivibrators using 555 timer and its applications.
	OC 5.	acquire a fundamental understanding of regulated power supply, shunt and series regulator.
9	Modules / Units: - There will be One Module / Unit Per Credit	
	Module I / Unit I: Transistors and SCR (15 Hours)	
	1. Field Effect Transistor: Introduction of JFET, Advantages and disadvantages of JFET over BJT, Classification of FET , Construction of n-channel and p- channel JFET, Biasing of JFET: biasing in ohmic region (Gate bias), biasing in active region (self-bias), Operation of n-channel JFET, JFET characteristics: Drain characteristics (output characteristics), Transfer characteristics, parameters of JFET (dynamic resistance(r_d), Transconductance (g_m) and amplification factor) , Applications of JFET, JFET as common source amplifier , JFET as analog Switch, JFET as voltage variable resistor (VVR).	
	MB: 11.1 to 11.9	
	2. MOSFET: Circuit symbol and construction of n-channel and p-channel MOSFET, Principle of operation and characteristics of n-channel Depletion and Enhancement mode MOSFET, digital switching (Analog, Digital and Switching circuits).	

	MB: 12.1, 12.2, 12.4, 12.6 3. SCR: Construction (structure & circuit symbol), operation of SCR, firing and Gate triggering of SCR, characteristics of SCR, specification parameters of SCR. AM: 28.1 4. UJT: Circuit symbol & construction of UJT, operating principle, characteristics of UJT, specification parameters of UJT and relaxation oscillator. AM: 28.5	
	Module II / Unit II: Amplifiers, Multivibrators and Power Supplies (15 Hours)	
	1. Differential amplifier using transistor the differential amplifier DC and AC analysis of a differential amplifier, Op-AMP applications: log amplifier, instrumentation amplifier, square and triangular wave generator using OP-AMP and Wien-Bridge oscillator using OP-AMP. MB: 15.1 to 15.5 KVR: 13.3.1, 13.4.2, 14.3.4.2, 14.5.2.2, 14.5.3 2. Transistor multivibrator: Astable, Monostable and Bistable multivibrators AM: 18.11 3. 555 Timer: Functional block diagram, Monostable and Astable operation, Application of 555 timer: voltage-controlled oscillator, pulse width moderator and pulse position modulator MB: 21.7, 21.8, 21.9.5 4. Regulated Power supplies: supply characteristics, Voltage regulator parameter, Basic configurations of voltage regulator, Shunt and series regulators, short circuit protection. MB: 22.1, 22.2, 22.3, 22.4, 22.5	
10	Reference Books: 1. MB: Electronic Principles, Malvino & Bates -7th Edition TMH Publication. 2. AM: Electronic Devices and Circuits, Allen Mottershead -PHI Publication. 3. KVR: Functional Electronics, K.V. Ramanan-TMH Publication Additional Reference Books: 1. RYB: Basics Electronic Devices and Circuits – R. Y. Borse 2. VKM: Principles of Electronics: V.K. Mehta & Rohit Mehta, Multicolour Illustrative Edition, S. Chand & Company 3. ML: Digital Principles and Applications, Malvino and Leach (4th Edition) (TMH).	
11	Internal Continuous Assessment: 40% (20 Marks)	External Assessment, (60%) (30 Marks)
12	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)	Evaluation: through Exam at the End of the Semester / Term.
13	Format of Question Paper for Semester End Examination Total Marks: 30 Marks Duration: One Hour	

	Module I / Unit-I 15 Marks	Q.1 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory	10 Marks
		Q.1 B) Attempt any One (Each carry 0 Marks) i) Problem /Theory ii) Problem	05 Marks
	Module II / Unit-II 15 Marks	Q.2 A) Attempt any Two (Each carry -5 Marks) i) Theory ii) Theory iii) Theory iv) Theory	10 Marks
		Q.2 B) Attempt any One (Each carry 05 Marks) i) Problem / Theory ii) Problem	05 Marks