SCHEME OF COURSE WORK

Course Details:

Course Title	Electronic Devices and Circuits
Course Code	15EC1101
Program	B.Tech
Branch	Information Technology
Semester	2
Prerequisites	Basic Electrical Engineering, Network Analysis, Engineering Physics and Basics of Mathematics
Course to which it is prerequisite	All advanced courses in electronics.

Course outcomes (CO's):

CO 1: Identify different materials used for an electronic device & describe the characteristics of various diodes and Design power supplies using Rectifiers and Filters.

CO 2: Analyze the characteristics of BJT, JFET, MOSFET, and UJT.

CO 3: Illustrate various biasing Techniques for a transistor and perform DC Analysis.

CO 4: To perform AC Analysis of a BJT using small signal model.

CO 5: Identify the different feedback amplifiers and design various low and high frequency oscillators.

Program Outcomes (POs):

A graduate of computer science engineering will be able to

1	PO-1: Apply the knowledge of basic sciences and electrical and electronics engineering fundamentals to solve the problems of power systems and drives
2	PO-2: Analyze power systems that efficiently generate, transmit and distribute electrical power in the context of present Information and Communications Technology
3	PO-3: Design and develop electrical machines and associated controls with due considerations to societal and environmental issues
4	PO-4: Design and conduct experiments, analyze and interpret experimental data for performance analysis
5	PO-5: Apply appropriate simulation tools for modeling and evaluation of electrical systems
6	PO-6: Apply the electrical engineering knowledge to assess the health and safety issues and their consequences
7	PO-7: Demonstrate electrical engineering principles for creating solutions for sustainable development
8	PO-8: Develop a techno ethical personality that help to serve the people in general and Electrical and Electronics Engineering in particular

9	PO-9: Develop leadership skills and work effectively in a team to achieve project objectives
10	PO-10: Communicate effectively in both verbal and written form
11	PO-11: Understand the principles of management and finance to manage project in multi disciplinary environments
12	PO-12: Pursue life-long learning as a means of enhancing the knowledge and skills

Course Outcome/Program Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO-1	3	3		2			2	3				2			
CO-2	3	3		2		2	2	3				3			
CO-3	3	3	2		2		3	3				3			
CO-4	3	3			2		3	3				3			
CO-5	3	2			2		3	2				3			

S - Strongly correlated, M - Moderately correlated, Blank - No correlation

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	Topic/Contents	Course Outcomes	Sample questions	Teaching -Learning Strategy	Assessment Method & Schedule
1	Introduction to Semiconductor materials, VI Characteristics of Diode, Zener diode Characteristics, Zener diode as Voltage Regulator, Tunnel diode , LED	CO-1	1. Define energy gap and explain the differences for insulators, conductors and semiconductors materials 2. Explain the VI Characteristics of a diode and compare Ge and Si Diode characteristics. 3. Design a zener regulator to meet the following specifications: Load voltage V_L=7.5V, source voltage V_s= 25V and load current I_L= 30mA.	Lecture/ Discussion	Mid-Test 1 (Week 9)

2	Rectifiers- Half wave rectifier, Full wave rectifier Advantages of full wave rectifier Over half wave rectifier	CO-1	1. A single phase full – wave rectifier uses semiconductor diodes. The voltage drop and internal resistance of the diodes may be neglected. Assume an ideal transformer. 2. Prove that one diode conducts for one half cycle and that the other diode conducts for the remaining half cycle of the input line voltage if the load consists of a resistor R in series with an inductor L.	Lecture/ PPT	Mid-Test 1 (Week 9)
			3. What are the advantages of full wave rectification over half wave rectification?		
3	C-Filter Inductor filter LC–Filter,∂' − fi□□□□	CO-1	1. Write about some of the applications of diodes. 2. What are the applications of LC Filters	Lecture/ PPT	Mid-Test 1 (Week 9)
4	Transistor Characteristics Bipolar Junction transistor(BJT) -input & output characteristics of transistor in CB, CE, CC Configuration,	C0-2	1. Explain CB and CE configuration of a transistor 2. A Transistor has a power rating of 600mW. If the collector-to-emitter voltage is 10mA, what would happen to the transistor?	Lecture/ Problem Solving	Mid-Test 1 (Week 9)
5	Relations between □', □^, □˜	C0-2	1. Explain the relati ns between □', □^, □˜	Lecture/ Discussion	Mid-Test 1 (Week 9)
6	Characteristics of JFET, MOSFET (Enhancement and depletion), characteristics of UJT	C0-2	1. Obtain the characteristics of JFET the 2. Explain characteristics of UJT	Lecture/ PPT	Mid-Test 1 (Week 9)
7	Biasing and Stability Need for biasing, Criteria for fixing the operating point, thermal run away	C0-3	1. Define biasing 2. Explain the criteria for fixing the operating point	Lecture/ Discussion	Assignment (Week 7 - 8)

8	Thermal stability , stabilization techniques	C0-3	1. What is meant by thermal stability in a transistor? 2. A better thermal stability can be achieved in the emitter-feedback bias circuits than the fixed-bias circuits. Why?	Lecture/ Discussion	Quiz (Week 1 - 7)
9	Mid test -1	C0-1, C0-2& C0-3		-	
10	SMALL SIGNAL AMPLIFIERS: h-parameter representation of a Transistor, Analysis of single stage transistor amplifier using h-parameters	C0-4	1. Obtain the h-parameters of a transistor	Lecture/ Discussion	Mid-Test 2 (Week 18)
11	Comparison of transistor configurations in terms of A_v, A_I, R_i, R_o	C0-4	1. compare configuration of transistor in terms of A_v, A_I, R_i, R_o	Lecture/Discussion	Assignment (Week 12 - 13)
12	FEEDBACK AMPLIFIERS:	C0-5	1. What is the ratio of the half-power frequencies with	Lecture/Problem Solving	Mid-Test 2 (Week 18)
	Concept of feedback, classification of feedback amplifiers,		feedback to those without feedback 2. What are the basic characteristics of an ideal operational amplifier?		
13	General characteristics of negative feedback amplifiers,	C0-5	1. Since negative amplifier in an amplifer reduces transfer gain, why is it used? 2. Define the input and output offset voltages of an practical operational amplifier.	Lecture/Problem solving	Mid-Test 2 (Week 18)
14	effect of negative feedback on input and output Resistances	C0-5	1. For an output of 36 V with 1 percent second harmonic distrortion what is the input voltage 2. How does the negative feedback in an amplifier reduce the effect of noise the amplifier circuit?	Lecture/Discussion	Mid-Test 2 (Week 18)

15	OSCILLATORS: Condition for oscillations, RC Phase shift oscillator with Transistor	CO-5	1. Explain the working of a RC Phase shift oscillator	Lecture/Discussion	Quiz (Week 10- 14)
16	Wein Bridge Oscillator,	C0-5	1. Explain the working of a wein bridge oscillator 2.	Lecture/Problem Solving	Seminar (Week 16)
17	Hartley and Colpitts Oscillators		1. Describe the working of Hartley oscillator 2. Explain the working of colpitts oscillator	Lecture/Discussion	
18	Mid-Test 2	C0-4,& C0-5		-	Mid- Test 2
19 & 20	END EXAM	All Co's			External Exam