BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

ES101: BASIC ELECTRONICS
CREDITS - 4 (LTP:3,0,1)

Course Objectives:

The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering to facilitate better understanding of the devices, instruments and sensors used in engineering applications. Lab should be taken concurrently. This course emphasizes more on the laboratory/practical use of the knowledge gained from the course lectures.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory		Practical		
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No	Topics	Teaching Hours
1.	**Diode theory and Applications** Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Design of un regulated DC power supply, Clipping circuit, Clamping circuit, Voltage multiplier circuit. Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR) – Operation, Construction, Characteristics, Ratings, Applications;	10
2.	**Bipolar Junction Transistor** Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration; Biasing BJT switching circuits.	10
3.	**Transistor Amplifiers and Oscillators** Classification, Small Signal Amplifiers –Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion, AC Equivalent Circuit; Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers; Oscillators – Classification, RC Phase Shift, Wien Bridge, High Frequency LC and Non-Sinusoidal type Oscillators	7

Unit No	Topics	Teaching Hours
4.	**Field Effect Transistor (FET)** Construction, Characteristics of Junction FET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs, Introduction to CMOS circuits, FET biasing in ohmic region and active region.	7
5.	**Operational Amplifiers and Applications** Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op- Amp, Characteristics of Ideal OpAmp, Concept of Virtual Ground; Op-Amp Applications – Invering amplifier, Non Inverting amplifier, Differential amplifier, Adder, Subtractor, Voltage Follower and Comparator; Differentiator and Integrator, Astable and Monostable Multivibrators.	8
	Total	**42**

Practicals:

Module 1:
Laboratory Sessions covering, Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT and DIP), Bread Boards and Printed Circuit Boards (PCBs); Identification, Specifications, Testing of Active Devices – Diodes, BJTs, JFETs, MOSFETs, Power Transistors, SCRs and LEDs

Module 2:
Study and Operation of Digital Multi Meter, Function / Signal Generator, Regulated Power Supply (RPS), Cathode Ray Oscilloscopes; Amplitude, Phase and Frequency of Sinusoidal Signals using Lissajous Patterns on CRO; (CRO);

Module 3:
Experimental Verification of PN Junction Diode Characteristics in A) Forward Bias B) Reverse Bias, Zener Diode Characteristics and Zener Diode as Voltage Regulator, Input and Output Characteristics of BJT in Common Emitter (CE) Configuration,

Module 4:
Study of Half Wave and Full Wave Rectification, Regulation with Filters, Gain and
Bandwidth of BJT Common Emitter (CE) Amplifier, Drain and Transfer Characteristics of JFET in Common Source (CS) Configuration; Gain and Bandwidth of JFET Common Source (CS) Amplifier, Gain and Bandwidth of BJT Current Series and Voltage Series Feedback Amplifiers, Oscillation Frequency of BJT based RC Phase Shift, Hartley and Colpitts Oscillators;

Module 5:
Op-Amp Applications – Adder, Subtractor, Voltage Follower and Comparator; Op-Amp Applications – Differentiator and Integrator, Square Wave and Triangular Wave Generation,

Text/Reference Books:

1. David. A. Bell (2003), "*Laboratory Manual for Electronic Devices and Circuits"*, Prentice Hall, India
2. Santiram Kal (2002), "*Basic Electronics- Devices, Circuits and IT Fundamentals"*, Prentice Hall,India
3. Thomas L. Floyd and R. P. Jain (2009), "*Digital Fundamentals*" by Pearson Education,
4. Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), "*Basic Electronics – A Text-Lab. Manual,TMH"*
5. R.T. Paynter (2009), "*Introductory Electronic Devices & Circuits, Conventional Flow Version,*" Pearson
6. R. Boylested and L. Nashelsky. "*Electronics Devices and Circuit Theory*", Pearson Education.

Course Outcomes (COs):

At the end of this course students will be able to:

1. Acquire knowledge about diode theory and its application.
2. Analyze the performance of BJTs and its uses in amplifiers and oscillators
3. Gain idea about CMOS structure and Operation of MOS transistor.
4. Analyze and design the operational amplifiers circuits.