

**PET3G001 ANALOG ELECTRONICS CIRCUIT (3-0-2)**

**MODULE – I**

**(12 Hours)**

**MOS Field-Effect Transistor:** Principle and Operation of FETs and MOSFETs; P-Channel and N-Channel MOSFET; Complimentary MOS; V-I Characteristics of E- MOSFET and D-MOSFET; MOSFET as an Amplifier and as a Switch. (4 Hours)

**Biasing of BJTs:** Load lines (AC and DC); Operating Points; Fixed Bias and Self Bias, DC Bias with Voltage Feedback; Bias Stabilization; Examples. (4 Hours)

**Biasing of FETs and MOSFETs:** Fixed Bias Configuration and Self Bias Configuration, Voltage Divider Bias and Design (4 Hours)

**MODULE – II**

**(12 Hours)**

**Small Signal Analysis of BJTs:** Small-Signal Equivalent-Circuit Models; Small Signal Analysis of CE, CC, CB amplifiers. Effects of  $R_S$  and  $R_L$  on CE amplifier operation, Emitter Follower; Cascade amplifier, Darlington Connection and Current Mirror Circuits. (6 Hours)

**Small Signal Analysis of FETs:** Small-Signal Equivalent-Circuit Model, Small Signal Analysis of CS, CD, CG Amplifiers. Effects of  $R_{SIG}$  and  $R_L$  on CS Amplifier; Source Follower and Cascaded System. (6 Hours)

**MODULE – III**

**(5 hours)**

**High Frequency Response of FETs and BJTs:** High Frequency equivalent models and frequency Response of BJTs and FETs; Frequency Response of CS Amplifier, Frequency Response of CE Amplifier. (5 Hours)

**MODULE – IV (9 hours)**

**Feedback amplifier and Oscillators:** Concepts of negative and positive feedback; Four Basic Feedback Topologies, Practical Feedback Circuits, Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator Circuits. (4 Hours)

**Operational Amplifier:** Ideal Op-Amp, Differential Amplifier, Op-Amp Parameters, Non-inverting Configurations, Open-loop and Closed-loop Gains, Differentiator and Integrator, Instrumentation amplifier. (5Hours)

**Additional Module (Terminal Examination-Internal)**

**(6 hours)**

Basic analysis of difference amplifier, Simulation of analog circuits i.e., different single and cascaded amplifier circuits, difference amplifier circuits and validating the theoretical parameters using PSpice and MULTISIM. Analysis op-amp IC circuits using LF411 and  $\mu A$  741, Signal Generators using OPAMP: Square, triangle and ramp generator circuits using opamps - Effect of slew rate on waveform generation-introduction to analog simulation OPAMP as nonlinear element: comparator, Voltage controlled oscillator (VCO). Concept of Schmitt triggers circuit and sample/hold circuit using operational amplifier

**Text Books**

1. *Electronic Devices and Circuits theory, R.L. Boylestad and L. Nashelsky, Pearson Education, New Delhi , 9<sup>th</sup>/10<sup>th</sup> Edition,2013. (Selected portions of Chapter 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14)*
2. *Milliman's Electronics Devices and Circuits, J. Milliman, C. Halkias, S. Jit., Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2<sup>nd</sup> Edition,2008.*

**Reference Books**

1. *Microelectronics Circuits, Adel Sedra and Kenneth C Smith, Oxford University Press, New Delhi, 5<sup>th</sup> Edition, International Student Edition,2009. (Selected portion of Chapter 2,4, 5, 6, 8, 13, and 14)*
2. *Electronic Devices and Circuits, Jimmie J. Cathey adapted by Ajay Kumar Singh, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3<sup>rd</sup> Edition, (For Problem Solving)*
3. *Electronics Circuits Analysis and Design, Donald A. Neamen, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3<sup>rd</sup> Edition,2002.*
4. *Integrated Electronics: Analog and Digital Circuits and Systems, J. Milliman, C. Halkias, Tata McGraw Hill Publishing Company Ltd., New Delhi,2<sup>nd</sup> Edition.2004.*
5. *Microelectronic Circuits: Analysis and Design, M.H. Rashid, PWS Publishing Company, a division of Thomson Learning Inc. India Edition.*
6. *Electronic device and circuits, David A. Bell, Oxford University Press, 5<sup>th</sup>edition,2008.*
7. *Electronics devices and circuits, Anil.K.Maini, Wiley India Pvt.Ltd,2009*

TENTATIVE  
Likely to be Modified