**M.Sc. Physics Semester -III Paper- XIX**
**Electronics – I 23PHY23DA2**

Theory Marks:80
Internal Assessment Marks:20
Time: 3 Hours

**COURSE OUTCOMES**

After successful completion of the course, the students will be able to

CO1 understand about the transistor amplifiers and it low frequency response.
CO2 understand the feedback process in amplifiers and generation of signal through oscillator.
CO3 realize the performance of operational amplifier for various mathematical operationssuch as addition, subtraction, differentiation, integration etc.
CO4 understand circuit analysis and implementation of operational amplifier for various applications like comparator, A/D & D/A convertor, oscillators etc.

**Unit I**

Bipolar junction Transistor (BJT): Transistor action, Transistor biasing techniques and characteristics, Amplifying action, AC/DC load line, Transistor models and parameters, Equivalent circuits, Two-Port devices and Hybrid model, Transistor Hybrid model, Transistor h-parameters, Conversion for h-parameter for three Transistor Configurations, Analysis of a Transistor Amplifier Circuit for CE, CB, CC, Comparison of Transistor Amplifier Configurations, Linear Analysis of a Transistor Circuit, Miller's Theorem and its Dual, Cascading Transistor Amplifiers, classification of amplifiers, frequency response, RC coupled amplifier and its frequency response

**Unit II**

Feedback-positive and negative feedback, Effect of negative feedback on gain, Non-linear distortion, input resistance, Frequency response, Voltage series and shunt feedback, Current series feedback. Transistor Power amplifiers: Class A, Class B, Class A push pull and Class B push pull amplifier

Principle of oscillations, condition for sustained oscillation, RF Oscillators using BJT, Hartley, Colpitts, Crystal Oscillator (Principle of working and frequency oscillation); AF Oscillators using BJT: Wein Bridge, Phase shift Oscillators. Multivibrator (Astable, Bistable, Monostable)

**Unit III**

Differential amplifier, CMRR, circuit configuration, emitter coupled supplied with constant current, transfer characteristics, block diagram of Op. Amp. Off-set currents and voltages, PSRR, Slew rate, universal balancing techniques, Inverting and non-inverting amplifier, basic applications- summing, scaling, current to voltage and voltage to current signal conversion, differential dc amplifier, voltage follower, bridge amplifier, AC-coupled amplifier. Integration, differentiation, analog computation, Butterworth active filters circuits,

**Unit IV**

Comparators, AC/DC converters: Half wave & full wave rectifier, clamping circuits, Logarithmic amplifier, antilogarithmic amplifier, sample and hold circuits Digital to analog conversion –ladder and weighted resistor types, analog to digital conversion- counter type, regenerative comparator (Schmitt trigger), Oscillators using op-amp,: Feedback, Square wave generator, pulse generator, triangle wave generator. Sinusoidal oscillators: Phase shift, Colpitts, Hartley and Wein Bridge oscillator

**Note:**The syllabus is divided into four units. Nine questions will be set in all. Question No.1 will be compulsory having four to eight parts covering the whole syllabus. In addition there will be two questions from each unit and the student is to answer one question from each unit. A student has to attempt five questions in all.

**Text and Reference books:**


[1] Integrated Electronics by J. Millman and C.C.Halkias(Tata-McGraw Hill)
[2] Fundamental of Electronics by J.D.Ryder (Prentice Hall Publication).
[3] Electronics communication Systems by George Kennedy and Bernard George (McGraw Hill).
[4] Linear Integrated Circuits by D.RoyChoudhury and Shail Jain (Wiley Eastern Ltd)
[5] Solid State Electronic Devices by Ben G. Streetman ((Prentice Hall of India)
[6] Electronic Devices and Circuit Theory by Robert L. Boylestad (Pearson).
[7] Electronic Devices and Circuits, by David A. Bell (Oxford)