

## **EX - 304 Electronics Devices & Circuits -I**

### **Unit I**

**Semiconductor Diode & Rectifiers:** Semiconductor diodes, ideal & practical diode equivalent circuit & frequency response, graphical analysis of diode circuits, diode applications, clipping and clamping circuits, half wave & full wave rectifier circuits with & without filters. Type of diodes and their applications, Signal diodes, Power Diode, Zener diode, Varactor diode, Schottky diode, PIN diode, Tunnel diode, Photo diode. Direct tunneling equivalent circuit, Tunnel diode oscillator; Solar Cell, LED, LEDs specification & geometry of LEDs, Colours of LEDs, LCD, Diffusion and Transition capacitance of P-N junction diode, Simple zener regulators.

### **Unit II**

**Transistor Characteristics:** Construction, principle of operation, V-I characteristics, Symbols, equivalent circuit, parameter calculations, applications, limitations and specifications of BJT, FET, UJT and MOSFET'S (Different configurations of transistors are to be considered), Specifications of BJT, FET, UJT and MOSFET's.

### **Unit III**

**Amplifiers:** Biasing, DC Equivalent Model, criteria for fixing operating point and methods of bias stabilization, thermal runaway and thermal stability, small signal low- frequency transistor amplifier – circuits; h-parameters, representation of transistor, analysis of single stage transistor amplifier using h-parameters, voltage gain current gain, input impedance output impedance, Comparison of BJT & FET. RC coupled amplifier – frequency response, cascaded amplifiers (all configurations of BJT and FET are to be considered). High frequency model of transistor  $\beta$  and  $f_T$ , cut-off frequencies of a transistor, single stage and multi stage amplifiers, Calculation of bandwidth of single and multistage amplifiers, concept of gain bandwidth product. Specifications of amplifiers, effect of cascading on bandwidth, Darlington amplifier, boot strapping, stability and thermal consideration, Noise in BJT.

### **Unit IV**

**Feedback Amplifiers and Oscillators:** Concept of feedback, negative & positive feedback gain & sensitivity, Bandwidth, classification of feedback amplifiers, general characteristics of negative feedback amplifier, effect of feedback on amplifiers characteristics, condition for oscillation, RC and LC type of oscillators, Crystal oscillators, frequency and amplitude stability of oscillations, Generalized analysis of LC oscillators, quartz, Hartley Clapp, R-C Phase shift and Wein Bridge oscillators, UJT oscillator.

### **Unit V**

**Power Amplifiers and Tuned Amplifiers & Regulator:** Classification of power amplifiers, Class A,B,AB and C power amplifiers, Push pull & complementary push pull amplifiers. Design of heat sinks, Power output, efficiency, cross – over distortion and harmonic distortion, Derating curve. Specifications of power amplifiers, single tuned and double tuned voltage amplifiers. Interstage design, Stability consideration, Class B and Class C tuned power amplifiers and specifications.

### **References:**

1. Nashelsky & Boysted; Electronic Devices and Circuits; PHI
2. Millman Halkias; Electronic Devices and Circuits; McGraw- Hill
3. Millman & Grabel; Micro Electronics; McGraw-Hill
4. Salivahanan; Electronic Devices and Circuits; TMH
5. Cathey; Electronic devices and circuits (Shaum); TMH
6. Bogart; Electronic Devices and Circuits; Universal Book Stall, Delhi
7. Millman & Halkias; Integrated Electronics; McGraw- Hill.
8. Nagrath I.J.; Electronics; PHI

**List of experiments (expandable):**

1. V-I Characteristics of different types of Diodes.
2. Applications of diodes and Design of various clipping and clamping circuits.
3. Design half & full wave rectifier
4. Design & Analysis of transistor amplifier in CE, CB & CC configuration.
5. Use of UJT as relaxation Oscillator.
6. Design & Analysis of JFET Amplifier.
7. Design & Analysis of MOSFET Amplifier.
8. To study and construct power amplifiers of various classes.
9. Study of various oscillators.

**NOTE-** - All experiments (wherever applicable) should be performed through the following steps.

**Step 1:** Circuit should be designed/ drafted on paper. **Step 2:** Where ever applicable the designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER etc.). **Step 3:** The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results. **Step 4:** Where ever required the bread board circuit should be fabricated on PCB.