ELECTRONIC DEVICES AND CIRCUITS

Course Code: 22EC11D3

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Course Outcomes: At the end of the course the student will be able to

CO 1 demonstrate the characteristics of PN Junction diodes and Zener Diode (L3)
CO 2 examine the V-I characteristics in different types of transistors (L3)
CO 3 apply biasing techniques to achieve thermal stabilisation (L4)
CO 4 analyze the performance of a transistor using h-parameters (L4)
CO 5 illustrate the function of feedback amplifiers and oscillators (L3)

UNIT-I **12 Lectures**

DIODE CHARACTERISTICS

Introduction to semiconductor materials, V-I Characteristics of Diode, Zener Diode Characteristics, Zener Diode as Voltage Regulator, Tunnel diode, LED.

RECTIFIERS AND FILTERS

Half wave rectifier, Full wave rectifier, Advantages of full wave rectifier over Half Wave rectifier, C- Filter, Inductor filter, LC- Filter, Pi- filter.

Learning outcomes: At the end of this unit, the student will be able to

1. understand V-I Characteristics of P-N Diode,Zener Diode (L2)
2. determine the behaviour of zener diode as voltage regulator (L3)
3. determine the ripple factor of rectifiers with and without filters (L3)

UNIT-II **10 Lectures**

TRANSISTOR CHARACTERISTICS:

Bipolar junction transistors (BJT) - input & output Characteristics of transistor in CB, CE, CC configurations, Relations between current gain parameters (alpha, beta and gamma), Characteristics of JFET, MOSFET (enhancement and depletion), Characteristics of UJT and SCR

Learning outcomes: At the end of this unit, the student will be able to

1. understand V-I characteristics of BJT and JFET (L2)
2. understand the V-I characteristics of MOSFET (L2)
3. illustrate the characteristics of different transistor configurations (L3)

UNIT-III **08 Lectures**

BIASING AND STABILITY:

Need for biasing, criteria for fixing the operating point, thermal run away, thermal stability, stabilization techniques.

Learning outcomes: At the end of this unit, the student will be able to

1. understand the need for biasing (L2)
2. describe thermal stability (L2)
3. illustrate different stabilization techniques (L3)

UNIT-IV **08 Lectures**

SMALL SIGNAL AMPLIFIERS:

h-parameter representation of a Transistor, Analysis of single stage transistor amplifier usingh-parameters, comparison of transistor configurations in terms of A_v, A_i, R_i, R_o.

Learning outcomes: At the end of this unit, the student will be able to

1. summarize the importance of h-parameter representation of transistor (L2)
2. analyze various transistor configurations in terms of gain and resistive parameters (L4)
3. determine gain, input resistance, and output resistance (L3)

UNIT-V **10 Lectures**

FEEDBACK AMPLIFIERS:

Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of negative feedback on input and output Resistances.

OSCILLATORS:

Condition for oscillations, RC Phase shift oscillator with Transistor, Wein bridge oscillator, Hartley and Colpitts oscillator.

Learning outcomes: At the end of this unit, the student will be able to

1. understand the concept of feedback amplifiers (L2)
2. summarize the importance negative feedback characteristic (L2)
3. discuss the functional behaviour of oscillators (L3)

TEXT BOOKS:

1. Millman Jacob Halkias C Christos, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw-Hill Publications, 2007.

REFERENCES:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, 10th Edition, Prentice Hall, 2008
2. J. Millman and A. Grabel, *Microelectronics*, McGraw Hill Education, 1988.
3. B.Visweswara Rao, K.Bhaskarram Murthy, K.Raja Rajeswari, P.Chalam Raju Pantulu. "*Electronic Devices and Circuits*", 2nd Edition, Pearson Publications, 2009
4. Raju GSN "Electronic Devices and Circuits", 1st Edition, IK International Publishing House, 2006.
5. Lal Kishore "Electronic Devices & Circuits", 2nd Edition, BSP Publications, 2005.

WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview