Vidyasagar University

Curriculum for B.Sc. (General) in Electronics [Choice Based Credit System]

Semester-I

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				\mathbf{L}	T	P		
CC1 [DSC-1A]		C1T: Network analysis and Analog Electronics	Core Course-1	4	0	0	6	75
		C1P: Network Analysis and Analog Electronics		0	0	4		
CC2 [DSC-2A]	TBD	DSC-2A (other Discipline)	Core Course-2				6	75
CC3 [DSC-3A]	TBD	DSC-3A (other Discipline)	Core Course-3				6	75
AECC		English	AECC (Elective)	1	1	0	2	50
		Semester Total					20	275

L=Lecture, T=Tutorial, P=Practical, CC = Core Course, TBD = To be decided, AECC= Ability Enhancement Compulsory Course

DSC-1 = Discipline Specific Core of Subject-1, **DSC-2** = Discipline Specific Core of Subject-2,**DSC-3** = Discipline Specific Core of Subject-3.

Semester-I Core Courses (CC)

CC - 1: NETWORK ANALYSIS AND ANALOG ELECTRONICS

Credits 06

C1T: Network analysis and Analog Electronics

Credits 04

Course Content:

Theory:

Circuit Analysis: Concept of Voltage and Current Sources. Kirchhoff's Current Law, Kirchhoff's Voltage Law. Mesh Analysis. Node Analysis. Star and Delta networks, Star-Delta Conversion. Principal of Duality. Superposition Theorem. Theorem. Theorem. Norton's Theorem. Reciprocity Theorem. Maximum Power Transfer Theorem. Two Port Networks: h, y and z parameters and their conversion.

Junction Diode and its applications: PN junction diode (Ideal and practical)- constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, dc load line analysis, Quiescent (Q) point. Zener diode, Reverse saturation current, Zener and avalanche breakdown. Qualitative idea of Schottky diode. Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, ripple factor and efficiency. Filter- Shunt capacitor filter, its role in power supply, output waveform, and working. Regulation- Line and load regulation, Zener diode as voltage regulator, and explanation for load and line regulation.

Bipolar Junction Transistor: Review of the characteristics of transistor in CE and CB configurations, Regions of operation (active, cut off and saturation), Current gains α and β . Relations between α and β . dc load line and Q point.

Amplifiers: Transistor biasing and Stabilization circuits- Fixed Bias and Voltage Divider Bias. Thermal runaway, stability and stability factor S. Transistor as a two port network, h-parameter equivalent circuit. Small signal analysis of single stage CE amplifier. Input and Output impedance, Current and Voltage gains. Class A, B and C Amplifiers.

Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.

Feedback in Amplifiers: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative only).

Sinusoidal Oscillators: Barkhausen criterion for sustained oscillations. Phase shift and Colpitt's oscillator. Determination of Frequency and Condition of oscillation.

Unipolar Devices: JFET. Construction, working and I-V characteristics (output and transfer), Pinchoff voltage. UJT, basic construction, working, equivalent circuit and I-V characteristics.

Suggested Readings:

- 1. Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill
- 2. Electrical Circuits, M. Nahvi & J. Edminister, Schaum's Outline Series, Tata McGraw-Hill
- 3. Electrical Circuits, K.A. Smith and R.E. Alley, Cambridge University Press
- 4. Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.
- 5. Electronic Devices and Circuits, David A. Bell, 5th Edition, Oxford University Press.
- 6. Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill
- 7. Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning
- 8. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, , 6th Edn., Oxford University Press.
- 9. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill
- 10. J. J. Cathey, Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill

C1P: Practical: Network Analysis and Analog Electronics

Credits 02

At least 06 experiments from the following:

- 1. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
- 2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
- 3. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
- 4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
- 5. Verification of the Maximum Power Transfer Theorem.
- 6. Study of the I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode.
- 7. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
- 8. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.
- 9. Study of the I-V Characteristics of UJT and design relaxation oscillator..
- 10. Study of the output and transfer I-V characteristics of common source JFET.
- 11. Study of Fixed Bias and Voltage divider bias configuration for CE transistor.
- 12. Design of a Single Stage CE amplifier of given gain.
- 13. Study of the RC Phase Shift Oscillator.
- 14. Study the Colpitt's oscillator.

Suggested Readings:

- 1. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill
- 2. Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.
- 3. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill
- 4. Allen Mottershead, Electronic Devices and Circuits, Goodyear Publishing Corporation.