BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 024.

B.Sc. ELECTRONICS: CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2022-23 onwards)

Sem.	Part	Course	Title	Ins. Hrs	Credit	Exam Hours	Marks		Total
							Int.	Ext.	
I	I	Language Course – I (Tamil $/Other Languages + #)		6	3	3	25	75	100
	II	English Course – I		6	3	3	25	75	100
	III	Core Course – I (CC)	Electric Circuits & Electronic Devices	5	5	3	25	75	100
		Core Practical – I (CP)	Electric Circuits & Electronic Devices Laboratory	4	4	3	40	60	100
		First Allied Course – I (AC)		4	4	3	25	75	100
		First Allied Course – II (AC)		3	-	-	-	-	-
	IV	Value Education		2	2	3	25	75	100
	TOTAL			**30**	**21**	**-**	**-**	**-**	**600**
II	I	Language Course – II (Tamil $/Other Languages + #)		6	3	3	25	75	100
	II	English Course – II		6	3	3	25	75	100
	III	Core Course – II (CC)	Analog Electronic Circuits	5	5	3	25	75	100
		Core Practical – II (CP)	Analog Electronic Circuits Laboratory	4	4	3	40	60	100
		First Allied Course – II (AC)		3	2	3	25	75	100
		First Allied Course – III (AC)		4	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100
	TOTAL			**30**	**23**	**-**	**-**	**-**	**700**

$ For those who studied Tamil upto 10th +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

Those who studied Tamil upto 10th +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

* Extension Activities shall be outside instruction hours.

List of Allied Courses

Allied Course I	**Allied Course II**
Mathematics	Chemistry / Computer Science

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	No. of Credits	Marks
1.	I	Language Courses	4	12	400
2.	II	English Courses	4	12	400
3.	III	Core Courses	9	45	900
4.		Core Practical	6	24	600
5.		Allied Courses I & II	4	16	400
6.		Allied Practical	2	4	200
7.		Major Based Elective Courses	2	8	200
8.		Project	1	3	100
9.	IV	Non-Major Elective Courses	2	4	200
10.		Skill Based Elective Courses	2	4	200
11.		Soft Skills Development	1	2	100
12.		Value Education	1	2	100
13.		Environmental Studies	1	2	100
14.	V	Gender Studies	1	1	100
15.		Extension Activities	1	1	---
16.	**Total**		**41**	**140**	**4000**

First Year **CORE COURSE I** **Semester I**

ELECTRIC CIRCUITS & ELECTRONIC DEVICES

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- To impart the basic ideas of circuits and devices.
- To improve the skills of the students in analysis of circuits.
- To acquire the ability to handle the s in a need-based manner.

UNIT - I PASSIVE COMPONENTS:

Resistors :- Types - Colour coding of Resistors - Resistors in series - Resistors in parallel - short circuit - open circuit; **Capacitors** :- Types - Factors affecting the capacity of a capacitor - Capacitors in series - capacitors in parallel - Energy stored in a capacitor; **Inductors** :- Types - Self-inductance - mutual inductance - Energy stored in an inductor - Transformer construction and its characteristics.

UNIT – II NETWORK THEOREMS AND BASICS OF DC & AC:

Ohm's law - Kirchhoff's law - node voltage analysis - mesh current method - super position theorem - Thevenin's theorem - Norton's theorem - Millman's theorem - simple problems; DC current - AC current - average value - RMS value - instantaneous value - RC, RL and RLC circuits.

UNIT – III INTRODUCTION TO SEMICONDUCTORS:

Classification of solids - conductors, insulators and semiconductors - energy band diagram - Intrinsic semiconductors - extrinsic semiconductors - doping of impurities- P type - N type - electron and hole current - direct band gap and indirect band gap.

UNIT – IV SEMICONDUCTOR DEVICES:

PN junction diode - V-I characteristics - diode as a switch - Avalanche break down - Zener break down - Zener diode - V-I characteristics - Bipolar junction Transistor - PNP - NPN - CB, CE and CC configurations - transistor as an amplifier.

UNIT – V SPECIAL SEMICONDUCTOR DEVICES:

FET - V-I characteristics - pinch off voltage - modes of operation - CS, CD and CG configuration - MOSFET and its modes of operation. - UJT - V-I characteristics - Relaxation oscillator - PNPN device - SCR construction and characteristics- DIAC and TRIAC Construction and characteristics.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Multimeter basic measurements - Testing of resistor - Testing of Capacitor - Testing of inductor and transformer - Testing of diode and transistor

REFERENCES

1. B. Grob, *Basic Electronics, 7th Ed.* (TMH Publishers, 1994)
2. V. K. Mehta and Rohit Mehta, *Principles of Electronics* (S. Chand & Co. Ltd., New Delhi, 2014).
3. Dennis L. Eggleston, *Basic Electronics for Scientists and Engineers* (Cambridge University Press, 2012).
4. M. Arumugam and N. Premakumaran, Electric Circuit theory (Khanna Publishers, 1979).
5. R. S. Sedha, A text Book of Applied Electronics (S. Chand & Co. Ltd., New Delhi, 2008).
6. Solid State Electronic Devices, 6th Edition by Ben G. Streetman & Sanjay Kumar Banerjee
7. Electronics Fundamentals. Circuits, Devices, and Applications by David M. Buchla & Thomas L. Floyd
8. [1] https://onlinecourses.nptel.ac.in/noc21_ee59/preview
9. [2] https://www.classcentral.com/course/swayam-network-analysis-17705
10. [3] https://onlinecourses.nptel.ac.in/noc21_ee80/preview

COURSE OUTCOME:

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

- get the basic ideas of Electricity.
- develop the circuit analysis.
- get idea of semiconductor theory.
- understand the operation of diode and transistor
- know the characteristics of devices and their operations.

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First Year **CORE PRACTICAL I** **Semester I**

ELECTRIC CIRCUITS & ELECTRONIC DEVICES LABORATORY

Code: **(Practical)** **Credit: 4**

COURSE OBJECTIVES:

- To impart the practical skills to test the circuits
- To familiarize the students with basic characteristics of electronic components.

1. Verification of Ohm's law.
2. Verification of Kirchoff's law.
3. Verification of Super position theorem.
4. Verification of Millman's theorem.
5. Verification of Thevenin's theorem.
6. Verification of Norton's theorem.
7. Transient response of RL circuit.
8. Transient response of RC circuit.
9. Series resonance circuit.
10. Parallel resonance circuit.
11. V-I characteristics of PN junction diode.
12. V-I characteristics of a Zener diode.
13. BJT CB characteristics.
14. BJT CE characteristics.
15. FET characteristics.
16. UJT and SCR characteristics.

REFERENCES:

1. H. W Jackson, D. Temple, B. Kelly, K. Craigs and L. Fuentes, Introduction to Electric Circuits: Lab Manual, 10th Ed. (OBU Publishers, 2019).

COURSE OUTCOME:

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

- verify all the basic laws and theorems
- characterize the BJT, FET, UJT, etc.

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First Year **CORE COURSE II** **Semester II**

ANALOG ELECTRONIC CIRCUITS

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- To enhance the knowledge of the students in advanced circuits.
- To gain ability to design and develop own electronic application.
- To impart the knowledge of electronic needs of society.

UNIT – I RECTIFIERS AND REGULATED POWER SUPPLY:

Half wave rectifier - Full wave rectifier - Bridge rectifier - efficiency- form factor - Zener diode as a voltage regulator - fixed voltage regulator ICs - Variable voltage regulator ICs.

UNIT – II TRANSISTOR BIASING:

Transistor biasing methods - Fixed bias - collector to base bias - potential divider bias - stability analysis - thermal runaway - Q point - load line analysis. H parameter analysis of BJT.

UNIT – III CLASSIFICATION OF AMPLIFIERS:

Types of coupling - RC coupled amplifier - frequency response - inductor coupled amplifier - transformer coupled amplifier and their frequency response - DC coupling - comparison. Feedback amplifiers: Positive feedback - negative feedback amplifiers - Effect of negative feedback in amplifiers - voltage and current feedback.

UNIT – IV POWER AMPLIFIER:

Class A amplifier - gain characteristics - efficiency - Class B Push-Pull amplifier - cross over distortion - efficiency - Class C amplifier - efficiency - Class D amplifier. Applications of power amplifiers.

UNIT – V OSCILLATORS AND MULTIVIBRATORS:

Barkhausen's criteria - damped oscillations in LC circuit - Hartley oscillator - Colpitts' oscillator - phase shift oscillator - crystal oscillator; Transistor multivibrators: Astable, mono stable and bistable multivibrators using translators - Schmitt trigger.

Unit – VI Current Contours (For continuous internal assessment only):

Clapp circuit - Sound generator - heat sink design - power saving - amplifier simulation.

REFERENCES:

1. V. K. Mehta, R. Mehta, Principles of Electronics (Chand & Co Ltd, 2008).
2. S. Salivahanan, N. Sureshkumar, Electronic devices and circuits, 4th Ed. (McGraw Hill, 2017).
3. R. S Sedha, A text Book of Applied Electronics, (S Chand & Co., 2008); SBN 13-978-8121927833.
4. Y.N. Bapat, Electronic Circuits and Systems: Analog and Digital, 1st Ed. (Tata McGraw-Hill Education, 1992)
5. Jacob Millman and Christos C Halkias, " Electronic devices and circuits" 3rd Edition, MH Publishers, ISBN 9780070700815
6. Electronic Principles (SIE) 7th Edition by Albert Malvino and David J. Bates, July 2017
7. Electrical and Electronic Principles Volume 1 by C R Robertson, 2000
8. https://www.edx.org/xseries/mitx-circuits-and-electronics
9. https://odp.inflibnet.ac.in/index.php/module_details?course=noc:analog%20circuits&source=swayam&subsource=NPTEL
10. https://www.swayamprabha.gov.in/index.php/program/archive/14

COURSE OUTCOME:

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

- Gain the knowledge of Rectifiers and power supply.
- Enhance skills in transistor biasing.
- Learn of all types of coupling of amplifiers
- Acquire knowledge in power amplifiers.
- Develop skills in oscillator circuits.

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First Year **CORE PRACTICAL II** **Semester II**

ANALOG ELECTRONIC CIRCUITS LABORATORY

Code: **(Practical)** **Credit: 4**

COURSE OBJECTIVES:

- To impart the practical skills on basic analog circuits.
- To gain practical knowledge on diode circuits and their applications.
- To practice transistors based elementary amplifier and oscillator circuits.

1. Construction of full wave rectifier using diodes.
2. Construction of Bridge rectifier using diodes.
3. Construction of Zener diode Voltage regulator.
4. IC regulated power supply using IC 7809 and 7909.
5. Determination of stability factor of Potential divider bias circuit.
6. Study the characteristics of Base bias circuit.
7. Construction and characteristics of Class A amplifier.
8. Construction and characteristics of Class B amplifier
9. Construction of Class C amplifier.
10. Voltage shunt feedback amplifier.
11. Hartley oscillator.
12. Colpitts' oscillator.
13. Schmitt trigger using BJT.
14. Astable multivibrator using BJT.
15. Mono stable multivibrator using BJT.
16. Bistable multivibrator using BJT.

REFERENCES:

1. K. Craigs and L. Fuentes, Introduction to Electric Circuits: Lab Manual, 10th Ed. (OBU Publishers, 2019).

COURSE OUTCOME:

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

- Learn all waveform generation techniques.
- Gain knowledge on the improvement of power amplifier circuit ideas.

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