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 Hour	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
		Add on Course – I ##	Professional English- I	6*	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Language Proficiency for Employability - Effective English	-	2	3	25	75	100
	TOTAL			**30**	**29**	**-**	**-**	**-**	**900**

III	I	Language Course – III Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course - III		6	3	3	25	75	100
	III	Core Course – III (CC)	Digital Electronics	5	5	3	25	75	100
		Core Practical - III (CP)	Digital Electronics Laboratory	4	4	3	40	60	100
		Second Allied Course – I (AC)		4	4	3	25	75	100
		Second Allied Practical (AP)		3	-	-	-	-	-
		Add on Course – II ##	Professional English - II	6*	4	3	25	75	100
	IV	Non-Major Elective I @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level **or** b) Special Tamil if Tamil language was studied upto 10th & 12th std.	Home Appliances	2	2	3	25	75	100
	TOTAL			**30**	**25**	**-**	**-**	**-**	**700**
IV	I	Language Course –IV Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course – IV		6	3	3	25	75	100
	III	Core Course - IV (CC)	Linear Integrated Circuits	5	5	3	25	75	100
		Core Practical - IV (CP)	Linear Integrated Circuits Laboratory	4	4	3	40	60	100
		Second Allied Practical (AP)		3	2	3	40	60	100
		Second Allied Course – II (AC)		4	4	3	25	75	100
	IV	Non-Major Elective II @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either c) Basic Tamil if Tamil language was not studied in school level **or** d) Special Tamil if Tamil language was studied upto 10th & 12th std.	Consumer Electronics	2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Digital Skills for Employability	-	2	3	25	75	100
	TOTAL			**30**	**25**	**-**	**-**	**-**	**800**

V	III	Core Course - V (CC)	Communication Systems	5	5	3	25	75	100
		Core Course – VI (CC)	Microprocessors and Microcontrollers	5	5	3	25	75	100
		Core Course – VII (CC)	Electronic Instrumentation	5	5	3	25	75	100
		Core Practical -V (CP)	Advanced Electronics Laboratory	4	4	3	40	60	100
		Major Based Elective – I (Any one)	1. Embedded Systems 2. Internet of Things	5	4	3	25	75	100
		Skill Based Elective- I	Mobile Phone Servicing	4	2	3	25	75	100
		Soft Skills Development		2	2	3	25	75	100
	TOTAL			**30**	**27**	**-**	**-**	**-**	**700**
VI	III	Core Course - VIII (CC)	Power Electronics	6	5	3	25	75	100
		Core Course - IX (CC)	VLSI Design	6	5	3	25	75	100
		Core Practical – VI (CP)	VLSI Design Laboratory	4	4	3	40	60	100
		Major Based Elective – II (Any one)	1. Biomedical Electronics 2. Wireless Communications	5	4	3	25	75	100
		Project		4	3	-	20	80	100
	IV	Skill Based Elective – II	Laptop Servicing and Troubleshooting	4	2	3	25	75	100
	V	Gender Studies		1	1	3	25	75	100
		Extension Activities **		-	1	-	-	-	-
	VI	Naan Mudhalvan Scheme (NMS) @@		-	2	3	25	75	100
	TOTAL			**30**	**27**	**-**	**-**	**-**	**800**
GRAND TOTAL				**180**	**154**	**-**	**-**	**-**	**4500**

List of Allied Courses

First Allied Course	**Second Allied Course**
Mathematics	Chemistry / Computer Science

$ 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.

The Professional English – Four Streams Course is offered in the 2nd and 3rd Semester (only for 2022-2023 Batch) in all UG Courses. It will be taught apart from the Existing hours of teaching / additional hours of teaching (1 hour /day) as a 4 credit paper as an add on course on par with Major Paper and completion of the paper is must to continue his / her studies further. (As per G.O. No. 76, Higher Education (K2) Department dated: 18.07.2020).

* The Extra 6 hrs / cycle as per the G.O. 76/2020 will be utilized for the Add on Professional English Course.

@ NCC Course is one of the Choices in Non-Major Elective Course. Only the NCC cadets are eligible to choose this course. However, NCC Course is not a Compulsory Course for the NCC Cadets.

** Extension Activities shall be outside instruction hours.

@@ Naan Mudhalvan Scheme

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.		Add on Courses	2	8	200
9.		Project	1	3	100
10.	IV	Non-Major Elective Courses	2	4	200
11.		Skill Based Elective Courses	2	4	200
12.		Soft Skills Development	1	2	100
13.		Value Education	1	2	100
14.		Environmental Studies	1	2	100
15.	V	Gender Studies	1	1	100
16.		Extension Activities	1	1	0
17.	VI	Naan Mudhalvan Scheme	3	6	300
	Total		**46**	**154**	**4500**

PROGRAMME OBJECTIVES:

- To inculcate skills those are relevant to the Industry Requirements and for the Research and Development sectors.
- To train the students to use novel ideas in the field of Electronics and provide smart solutions to Electronics Oriented Problems.
- To contribute the new inventions in the field of Electronics.
- To provide better knowledge in the Component Design areas and utilize the knowledge for their Self Employment.

PROGRAMME OUTCOME:

On the successful completion of the B.Sc. Electronics Programme, the students will

- To understand and apply the knowledge of Electronic devices, circuit design and Practical experience in the field of Electronics.
- To identify, analyze and solve the problems in design of digital circuits, Linear Integrated Circuits and bio Medical Instrumentation areas.
- To acquire and update the knowledge in the current Industrial trends including the concepts of Sensors, Microcontroller and Power Electronics.
- To independently carryout Entrepreneurship to fulfill day-to-day Electronics requirements.
- To utilize the knowledge to benefit the society with the innovative Products.

PROGRAMME EMPLOYMENT OPPORTUNITY:

This curriculum is designed to train young minds to develop their fundamental, analytical and problem-solving ability in electronics-oriented fields. In this way, it provides better opportunities to start a new venture, employability in Public and Private Sectors, BSNL (TTA), RRB, including ISRO, mainly as, ground Air Traffic Controllers in Airport Authorities, Production companies, and Hardware designers in Private Electronics Companies. Apart from this, a student will become an Entrepreneur and provide jobs to other job seekers.

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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 these concepts 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

- Familiarise 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 basic characteristics of Electronic components.

(Any twelve (12) Experiments)

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. Find the Transient response of RL circuit.
8. Find the Transient response of RC circuit.
9. Construct Series resonance circuit.
10. Construct Parallel resonance circuit.
11. Study the V-I characteristics of PN junction diode.
12. Study the V-I characteristics of a Zener diode.
13. Study the CB characteristics using BJT
14. Study the CE characteristics using BJT.
15. Study the FET characteristics.
16. Study the 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.

(Any twelve (12) Experiments)

1. Construct half and full wave rectifier using diodes.
2. Construct Bridge rectifier using diodes.
3. Construct Zener diode Voltage regulator.
4. Construct 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. Construct and study the characteristics of Class A amplifier.
8. Construct and study the characteristics of Class B amplifier
9. Construct of Class C amplifier.
10. Construct Voltage shunt feedback amplifier.
11. Design Hartley oscillator.
12. Design Colpitts' oscillator.
13. Construct Schmitt trigger using BJT.
14. Construct Astable multivibrator using BJT.
15. Construct Mono stable multivibrator using BJT.
16. Construct 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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Second Year **CORE COURSE III** **Semester III**

DIGITAL ELECTRONICS

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

COURSE OBJECTIVES:

- To acquire the knowledge about number system, code and Boolean algebra.
- To learn about logic gates and arithmetic circuits.
- To analyse about combinational logic circuit and sequential logic circuit
- To acquire knowledge about the various types of memory

UNIT – I Number Systems, Codes, Boolean Algebra:

Number System: Binary Numbers, Number base conversions, complements of numbers, Signed binary numbers. Code: Binary code, BCD Code, Excess -3 BCD code, Alpha Numeric Code. Boolean Algebra: Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms

UNIT – II Logic Gates & Arithmetic Circuits:

Logic Gates: OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR gates, NAND and NOR as universal gates. Arithmetic Circuits: Half adder - Full adder - Half Subtractor - Full Subtractor - Parallel binary adder - 4 bit binary adder AND Subtractor - BCD adder.

UNIT – III Combinational Logic Circuits:

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT – IV Sequential Logic Circuits:

Sequential Circuits: Latches, Flips-Flops - RS, JK, Master-Slave JK, D & T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters - Registers, Shift Registers, Ripple Counters, Synchronous counters, asynchronous counters. Asynchronous sequential circuits: Introduction, Analysis Procedure, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards.

UNIT – V Memory:

Memory organization, classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD, Flash memories, Content Addressable memory.

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

Modern Topics & Supporting Digital Electronics: Mobile Phones - Calculators and Digital Computers - Smart Card - Cathode Ray Oscilloscope (CRO) - Analog to Digital converters (ADC) - Digital to Analog converters (DAC).

REFERENCES:

1. M. M. Mano and M. D. Ciletti, Digital Design,5th Ed. (Pearson, 2012.
2. Z. Kohavi and N. K. Jha, Switching theory and Finite Automata Theory, 3rd Ed. (Cambridge, 2010).
3. S. Goshal, Digital Electronics, (Cambridge, 2012).
4. Anil K. Maini, Digital Electronics Principles Devices and Applications, (Wiley, 2007)
5. D. Schlichthärle, Digital Filters: Basics and Design, 2nd Ed. (Springer, 2011)
6. A. J Evans, Basic Digital Electronics (Master Publishing, 1996)
7. B. Bhatia and M. V. Subramanyam, Basics of Digital Electronics (Laxmi Publications, 2008)
8. R. L. Tokheim, Digital Electronics (Basic Skills in Electricity and Electronics)
9. https://nptel.ac.in/courses/117106086
10. https://ocw.mit.edu/courses/6-004-computation-structures-spring-2017/pages/c5/

COURSE OUTCOMES:

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

- Learn number systems, its conversions and Boolean algebra functions
- Verify the truth table of Logic gates and Arithmetic Operators.
- Understand combinational Logic Circuit
- Familiarize sequential Logic Circuits
- Gain knowledge on various types of memory and latest applications

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Second Year **CORE PRACTICAL III** **Semester III**

DIGITAL ELECTRONICS LABORATORY

Code: **(Practical)** **Credit: 5**

COURSE OBJECTIVES:

- To acquire practical knowledge in basics of logic gates using digital circuits.
- To construct and test adder, subtractor, multiplexer and demultiplexer circuits.
- To design and verify flip-flops, registers, and counters using digital ICs.

(Any twelve (12) Experiments)

1. Study and verify truth tables of AND, OR, NOT, NAND, NOR and XOR gates
2. Design of all logic gates using NAND gate
3. Design of all logic gates using NOR gate
4. Verify Demorgan's theorem.
5. Truth table verification of Half adder and Full adder
6. Truth table verification of Half subtractor and Full subtractor
7. 4:1 Multiplexer and 1:4 Demultiplexer
8. 4x2 Encoder and 2x4 Decoder
9. Design and Implement of J-K Flip flop.
10. Design and Implement of RS Flip Flop
11. Parallel-in and Parallel-out Shift register using 7495 IC
12. Design and Implement a 4 bit shift register using Flip flops
13. Design and Implement a Decade counter
14. Design and Implement the Up-Down counter.
15. Design and Implement the Ring Counter
16. Design and Implement the Ripple Counter.

REFERENCES:

1. S. K. Gupta , Basic Electronics digital and Microprocessor Manual

COURSE OUTCOMES:

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

- Understand combinational Logic Circuits.
- Familiarize sequential Logic Circuits.

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Second Year **NON MAJOR ELECTIVE I** **Semester III**

HOME APPLIANCES

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To acquire necessary skills/hands-on experience/working knowledge on ac/dc, motors, transformers, single phase and three phase connections.
- To understand basics of electrical wiring with electrical protection devices.
- To learn to check the electrical connections at house-hold appliances
- To develop the skill to repair the electrical appliances for the general troubleshoots and wiring faults.

UNIT – I Electrical and Electronics:

Introduction - Direct current (DC)- Alternating current (AC) -Voltage, Current, Resistance, Capacitance, Inductance, Electrical conductors and Insulators, Transformers, Electrical energy, Power, Kilowatt hour (kWh), consumption of electrical power.

UNIT – II Basics Electrical Systems:

Single phase and three phase connections - Basics of House wiring - Switch connection - Electric shock, Overloading, Earth connection, Short circuiting, Fuses, MCB, ELCB, Insulation, Inverter, UPS

UNIT – III Heating Appliances and Lights:

Heater types - working principle - Heating Rod - Electric Iron box, Water heater; Induction heater, Microwave oven - Concept of illumination, Electric bulbs, CFL, LED lights, Energy efficiency in electrical appliances, IS codes & IE codes

UNIT – IV Motorized Appliances:

Types of Motors - DC and AC motor - Principles of working, parts and servicing of Electric fan - mixers - wet grinders - circuit connection - testing methods. Washing machine - Electrical connections - assembly - Testing and troubleshooting methods.

UNIT – V Refrigeration Appliances:

Fridge - Electrical connection - Compressor - coolants - Automatic defrosts circuits - Testing and troubleshooting of refrigerators - Air coolers and Air conditioners - Mounting and fixing of Air Conditioners - testing and troubleshooting methods.

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

Wiring Practices: Studying the electrical performance and power consumption of a given number of bulbs connected in series and parallel circuits - Identifying

Phase, Neutral and Earth on power sockets- Studying electrical circuit protection using MCBs, ELCBs

REFERENCES:

1. S. P. Bali, Consumer Electronics (Pearson Education India, 2009)
2. K. P. Anwer, Domestic Appliances Servicing (Scholar Institute, 2018).
3. T. Linsely, Electronic Servicing and Repairs, 3rd Edition, (Rouledge, 2011).
4. B. L. Theraja, A Text book on Electrical Technology (S. Chand, 2006)

A. K. Theraja, A Text book on Electrical Technology (S. Chand, 2005)

5. M. G. Say, The Performance And Design Of Alternating Current Machines (CBS, 2002)
6. S. B. Sinha, Handbook of Repair and Maintenance of Domestic Electronics Appliances (BPB Publications, 2016)
7. https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/
8. https://onlinecourses.nptel.ac.in/noc22_me104/preview

COURSE OUTCOMES:

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

- Understand the classification of passive components
- Integrate trouble shooting skills in equipment servicing
- Acquire knowledge on operations of home appliances
- Acquire knowledge on maintenance and safety measures of home appliances
- Understand test and troubleshooting chart of home appliances.

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Second Year **CORE COURSE IV** **Semester IV**

LINEAR INTEGRATED CIRCUITS

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

COURSE OBJECTIVES:

- To acquire the knowledge about operational amplifier
- To learn about the applications of operational amplifier.
- To study about the concept of analog multiplier.
- To know about the conversion theory of ADC and DAC.
- To introduce the concept of Waveform Generator and Some IC's Special function.

UNIT – I Basics of Operational Amplifiers:

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps - Ideal Operational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC 741.

UNIT – II Applications of Operational Amplifiers:

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V inverters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Anti logarithmic amplifier, Comparators, Schmitt trigger, Low-pass, high-pass and band-pass Butterworth filters.

UNIT – III Analog to Digital and Digital to Analog Conversion & Converters:

Analog and Digital Data Conversions, D/A converter - specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R - 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits, A/D Converters - specifications - Flash type - Successive Approximation type - Single Slope type - Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters.

UNIT – IV Waveform Generators and IC Regulators:

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator.

UNIT – V IC 555 and Applications:

555 Timer: Functional block diagram, Monostable operation, applications in Monostable mode , missing pulse detector, linear ramp generator, frequency divider, pulse width modulation, Astable operation, applications in Astable mode, FSK generator, pulse-position modulator, 555 timer as Schmitt trigger - PLL - phase detector - voltage controlled oscillator

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

Any application using LIC: Voltage Comparator, Voltage Follower, Decorative LED strips using Astable multivibrators

REFERENCES:

1. D. Roy Choudhry and S. Jain, Linear Integrated Circuits, 5th Ed. (New Age International Pvt. Ltd., 2018)
2. S. Franco, Design with Operational Amplifiers and Analog Integrated Circuits‖, 4th Ed. (Tata Mc Graw-Hill, 2016).
3. R. A. Gayakwad, OP-AMP and Linear IC, 4th Ed. (Prentice Hall / Pearson Education, 2015).
4. R. F. Coughlin and F. F. Driscoll, Operational Amplifiers and Linear Integrated Circuit, 6th Ed. (PHI, 2001).
5. B. S. Sonde, System design using Integrated Circuits, 2nd Ed. (New Age Pub, 2001).
6. Gray and Meyer, Analysis and Design of Analog Integrated Circuits, 5th Ed. (Wiley International, 2009).
7. W. D. Stanley, Operational Amplifiers with Linear Integrated Circuits, (Pearson Education, 2001).
8. S. Salivahanan and V. S. K. Bhaskaran, Linear Integrated Circuits, 2nd Ed., 4th Reprint, (TMH, 2016).
9. https://www.classcentral.com/course/swayam-op-amp-practical-applications-design-simulation-and-implementation-14216.
10. https://nptel.ac.in/courses/108101089

COURSE OUTCOMES:

On completion of this course, student will be able to

- Design linear and nonlinear applications of Op-Amps
- Design applications using analog multiplier and PLL
- Design ADC and DAC using Op-Amps
- Generate waveforms using Op-Amp Circuits
- Analyse special function ICs.

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Second Year **CORE PRACTICAL IV** **Semester IV**

LINEAR INTEGRATED CIRCUITS LABORATORY

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

COURSE OBJECTIVES:

To provide the practical knowledge of linear Integrated Circuits

(Any twelve (12) Experiments)

1. Construct Inverting, Non inverting and differential amplifiers.
2. Design Integrator using Op-Amp
3. Design Differentiator using Op-Amp
4. Design Instrumentation amplifier using Op-Amp
5. Construct Active low-pass, High-pass and band-pass filters using Op-Amp
6. Design Analog multiplier using Op-Amp
7. Design Comparator using Op-Amp
8. Design Logarithmic Amplifier using Op-Amp
9. Design Anti-Lograthemic Amplifier using Op-Amp
10. Design Astable Multivibrator using Op-amp
11. Monostable Multivibrators using Op-amp
12. Construct Schmitt Trigger using op-amp.
13. Construct A/D Converter.
14. Construct R-2R Ladder Type D- A Converter using Op-amp.
15. Construct Sine Wave, Triangular Wave and Saw Tooth Wave Generator.
16. Construct Astable and Monostable Multivibrators using NE555 Timer

REFERENCES:

1. D. Roy Choudhry and S. Jain, Linear Integrated Circuits, 5th Ed. (New Age International Pvt. Ltd., 2018)

COURSE OUTCOMES:

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

- To acquire the knowledge about operational amplifier.
- To learn about the applications of operational amplifier.

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Second Year **NON MAJOR ELECTIVE II** **Semester IV**

CONSUMER ELECTRONICS

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To create awareness and skills to maintain various consumer electronic product/equipment
- To acquire knowledge in consumer electronics field on self-employment, conduct diagnostics - testing.

UNIT – I Audio Systems:

Microphone: Structure of microphone - Types of microphone -Head phone - Structure and Specification of speaker- Speaker types- Amplifier and mixer - power amplifier- Public Addressing system (PA) - Home Theatre audio system

UNIT – II Camera:

Introduction Cameras - Analog camera and Digital Camera- video camera - Camcorder - Infra Red Cameras - Wireless Cameras- spy camera -NVR and DVRS standards and operation - MPEG and JPEG Standards

UNIT – III Surveillance Devices:

Security system - CCTV systems - CCTV camera - CCTV types of camera - applications and limitations- Burglar Alarms -Video door phones -Smart car parking and anti-theft system -GPS trackers -RFID security systems

UNIT – IV Television:

Block diagram of monochrome and PAL color TV receivers - standards - LCD - LED TV - Plasma displays - Internet TV - HDMI, VGA AND MHL cords-LED projector - DTH - Set Top Box.

UNIT – V Smart Gadgets:

Introduction Smart Home Gadgets - applications and limitations -Smart Phones - IPODS - Tablets - Kindles - Satellite Radio - Bar Code Reader - ATMs

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

Advanced Home Automation: Smart home appliances - Inverter - Smart meters - IoT enabled: Air Conditioner - stabilizer - water heater

REFERENCES:

1. S. P. Bali, Consumer Electronics (Pearson Education India, Delhi, 2007).
2. R. G. Gupta, Audio video systems principles, maintenance and troubleshooting (McGraw Hill, New Delhi, 2010)
3. R. Bali and S. P. Bali, Audio video systems: principle practices and

troubleshooting (Khanna Book Publishing Co. (P) Ltd., Delhi, 2014).
4. R. R. Gulati, Modern Television Practice: Transmission, Reception and Applications (New Age International, New Delhi, 2015)
5. A. M. Dhake, Television and video Engineering (McGraw-Hill, New Delhi, 2006).
6. B.L. Theraja, A Text book on Electrical Technology, S. Chand& Co.,
7. A.K. Theraja , A Text book on Electrical Technology
8. M.G. Say, Performance and design of AC machines, ELBS Edn.,
9. Handbook of Repair & Maintenance of domestic electronics appliances; BPB Publications
10. Microphone: https://www.coursehero.com/file/l8404103/7-Microphonesppt/
11. https://nptel.ac.in/courses/117105083

COURSE OUTCOMES:

On completion of this course, student will be able to

- Gain knowledge on Troubleshoot different types of microphones and speakers.
- Understand the different types of audio systems and Maintain
- Learn surveillance devices and acquire knowledge on various smart gadget
- Diagnose, repair and maintain the consumer electronics products
- Understand to various consumer electronic appliances.

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Third Year	**CORE COURSE V**	**Semester V**
	COMMUNICATION SYSTEMS	
Code:	**(Theory)**	**Credit: 5**

COURSE OBJECTIVES:

- To acquire knowledge on electronic communication systems and their applications
- To learn about the applications of Analog Pulse Modulation and Digital Pulse modulation.
- To study about the concept of Receivers and Noise.

UNIT – I Amplitude Modulation:

Introduction to Communication Systems - Communication transceiver - Need for Modulation - Definition of Amplitude modulation - Mathematical Expression of AM wave - Modulation Index - frequency spectrum of AM wave - Power relations in AM wave - Types of AM: DSB - SC - AM, SSB - AM, VSB - AM - AM Linear Modulators - AM demodulators - AM Transmitters

UNIT – II Angle Modulation:

Definition of Frequency and Phase Modulation - Mathematical representation of FM and PM - Frequency spectrum of FM - Bandwidth of FM - Narrow Band and Wide Band FM - Generation of FM - Direct and indirect method - FM Demodulation - Generation of PM from FM - FM Transmitters

UNIT – III Receivers and Noise:

Block diagram of receivers - Types - Characteristics of receivers- Super heterodyne receiver -Double conversion receiver - Choice of IF frequencies - Tracking - AGC - Introduction and Classification of noise-Atmospheric noise-Thermal noise-Shot noise-Addition of noise due to several sources- Signal to Noise ratio-Noise figure

UNIT – IV Analog Pulse Modulation:

Sampling process - Pulse Amplitude Modulation - Bandwidth - Noise trade off - Aliasing - Eye pattern - Pulse Width Modulation: Generation and Detection - Applications - Pulse Position Modulation - Generation and Detection - Advantages

UNIT – V Digital Pulse Modulation:

Pulse Code Modulation - Block diagram - Quantization - Step size and error calculation - Applications- Differential pulse code modulation - delta modulation - Adaptive Delta Modulation - ASK, FSK and PSK

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

Antenna and Wave Propagation: EM waves - Free space propagation - Surface (Ground) wave propagation - Sky wave propagation - Space wave propagation -

Introduction to Antennas - Antenna Parameters - Types of Antennas - Effects of Height - Feed point - Impedance matching.

REFERENCES:

1. G. Kennedy and B. Davis, Electronic Communication Systems, 5th Ed. (2011)
2. G. Kennedy, B. Davis and S. R. M Prasanna, Kennedy's Electronic Communication Systems, 6th Ed. (McGraw Hill Education, 2017)
3. D. Roddy and J. Coolen, Electronic Communications, 4th Ed. (Person, 2008)
4. S. Haykin and M. Moher, Communication systems, 5th Ed. (Wiley, 2009)
5. R. P. Singh and S. D. Sapre, Communication Systems Analog and Digital (Tata McGraw Hill, 2017)
6. A. Singh, Principles of communication Engineering, (S. Chand & Co., 1994).
7. H. Taub and D. L. Schilling, Principles of communication, 4th Ed. (McGraw Hill, 2017)
8. N.D Deshpande, D.A. Deshpande, and P. K. Rangola, Communication electronics, 7th Reprint (Tata McGraw Hill, New Delhi, 1996)
9. K.D. Prasad, Antenna and Wave Propagation (Satya Prakashan, 2012).
10. https://nptel.ac.in/courses/117102059
11. https://onlinecourses.nptel.ac.in/noc22_ee115/preview

COURSE OUTCOME:

On completion of this course, student will be able to

- Understand the basics of Analog and Digital communication systems
- Acquire knowledge on various modulation techniques
- Inculcate different types of transmitters and receivers
- Analyse noise factors in communication systems
- Apply the Electromagnetic concepts in understanding antenna

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Third Year | **CORE COURSE VI MICROPROCESSORS AND MICROCONTROLLERS** | **Semester V**

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

COURSE OBJECTIVES:

- To acquire the fundamental of Intel microprocessor 8085 and advanced processors
- To acquire knowledge on Hardware Architecture of 8051
- To learn Programming with 8051 Microcontrollers

UNIT – I Introduction to Intel Microprocessor:

Overview of microprocessors - Architecture of 8085 microprocessor, ALU Timing and control unit – registers - Address bus and data bus – Pin configuration – Intel 8085 instructions - machine cycle - date flow- timing diagram – Addressing modes- Comparative study of Intel 8086, 286, 386, 486 & Pentium processors - Dual core -i3, i5 and i7 Processors .

UNIT – II Introduction to 8051 Microcontroller:

Introduction to Microcontrollers - Differences between Microcontrollers and Microprocessors - Architecture of 8051 - Pin description of 8051 - Registers - SFR - Flags and PSW - Internal ROM and RAM - Ports and Circuits.

UNIT – III On-chip Peripherals of 8051:

Timers of 8051 - Timer programming in various modes- Timer as Counter - Basics of serial communication - RS232 and MAX 232 IC connection - Modes and baud rates of serial communication- Serial communication registers -Serial communication programming - Introduction to Interrupts - 8051 Interrupts- Interrupt Enable and Priority registers - Internal and external interrupts programming-Parallel port programming

UNIT – IV Embedded Programming:

Introduction to Embedded C Programming - Difference between ASM and Embedded C programming - Structure of Embedded C Program - C Directives - Variables in Embedded C - Operators in Embedded C - Looping structure in Embedded C - C Functions- Arrays

UNIT – V Applications of Microcontrollers:

Basics of Interfacing I/O devices with 8051- Interfacing LED, Seven Segment Display - LCD - ADC and DAC interfacing - Interfacing Matrix keyboard - Interfacing sensors with 8051 - DC motor speed control by 8051 - Stepper motor Interfacing with 8051 for direction and angle control

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

Introduction to Keil µ Vision IDE :- User interface - creating Applications - Debug Commands - Debug Functions - Simulation - Flash Programming - Utilities - command line

REFERENCES:

1. Krishna kant, Microprocessors and microcontrollers :Architecture, Programming and system Design, 8085, 8086, 8051, 8096, (PHI, 2013)
2. M. A. Mazidi, J. G. Mazidi and R. D. McKinlay, The 8051 Microcontroller and Embedded Systems: Using Assembly and C, 2nd Ed. (Pearson Education, 2007)
3. K. J. Ayala, The 8051 Microcontroller architecture, programming and application (Delmar Cengage Learning, 2004)
4. K. Qian, D. D. Haring and L. Cao, Embedded Software Development with C, 1st Ed. (Springer, 2009)
5. Keil µ Vision 5 user manual
6. D. Calcutt, F. Cowan and H. Parchizadeh, 8051 Microcontroller: An Applications based Introduction (Elsevier, 2004)
7. 16-bit Microprocessor Design and Implementation on FPGA by Muhammad Ahmed, Mansoor Naseer , Arslan Malik (2012)
8. M. J. Pont, Programming Embedded Systems II: A 10 week course using C
9. https://onlinecourses.nptel.ac.in/noc20_ee11/preview
10. https://www.classcentral.com/course/youtube-8051-microcontroller-lecture-series-53060

COURSE OUTCOMES:

On completion of this course, student will be able to

- Acquire knowledge on Hardware architecture of 8051 microcontroller
- Understand the instruction set and addressing modes 8051 microcontroller
- Analyse on-chip peripherals of 8051
- Mind-Map peripheral interfacing with 8051for various applications
- Create and write Assembly and Embedded C programs for 8051 microcontroller

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Third Year **CORE COURSE VII** **Semester V**

ELECTRONIC INSTRUMENTATION

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

COURSE OBJECTIVES:

- To understand the electrical quantities of instruments and their measuring methods.
- To understand the designing aspects and performance criterion of measuring instruments.
- To understand the working principle of oscilloscope.
- To understand the various functions of transducers.

UNIT – I Performance Characteristics of Instruments:

Static characteristics, Accuracy, Resolution, Precision, Expected value, Error and Sensitivity - Errors in measurement and Dynamic characteristics: Speed of Response, Fidelity, Lag and Dynamic Error - Voltmeters: Multi-range, Range Extension, Solid State and Differential Voltmeters - Ammeters: Shunt and Thermocouple type Ammeter - Ohmmeters: Series type, Shunt type, Multimeter for Voltage, Current and Resistance Measurements - Digital Multimeters: Block diagram and Specifications

UNIT – II Signal Generators:

Fixed and Variable, AF Oscillators, Standard and AF Sine and Square Wave Signal Generators, Function Generators, Square Pulse, Random Noise and Sweep - Wave Analyzers: Harmonic Distortion Analyzers, Spectrum Analyzers and Digital Fourier analyzers.

UNIT – III Cathode Ray Oscilloscopes:

CRT Features, Vertical Amplifiers, Horizontal deflection system, Sweep, Trigger Pulse, Delay line, Sync Selector Circuits, Simple CRO, Triggered Sweep CRO, Dual Beam CRO, Measurement of Amplitude and Frequency - Dual Trace Oscilloscope, Sampling Oscilloscope, Storage Oscilloscope, Digital Storage Oscilloscope, Standard Specifications of CRO, Probes for CRO (Active and Passive), Attenuator type.

UNIT – IV AC Bridges:

Measurement of inductance: Maxwell's bridge, Anderson Bridge - Measurement of Capacitance: Schering Bridge - Kelvin's Bridge, Wheatstone Bridge and Wein Bridge - Errors and Precautions and Related Problems - Q-Meter - Bridges: Wheat Stone Bridge, Kelvin Bridge and Maxwell Bridge.

UNIT – V Active and Passive Transducers:

Resistance, Capacitance, Inductance, Strain Gauges, LVDT, Piezo Electric Transducers, Resistance Thermometers, Thermocouples, Thermistors and

Sensistor - Basic Hall Effect Sensors - Calibration and Standards and Data Acquisition Systems.

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

Distinguish between Analog and Digital Meters - Identify the industrial and laboratory applications of instruments.

REFERENCES:

1. H. S. Kalsi, Electronic instrumentation, 2nd Ed. (Tata Mc Graw Hill, 2004).
2. A.D. Helfrick and W.D. Cooper, Modern Electronic Instrumentation and Measurement Techniques 5th Ed. (PHI, 2002).
3. A. K. Sawhney, Electrical and Electronic Measurements and Instrumentation, 17th Ed. (Dhanpat Rai & Co., 2004).
4. D. A. Bell, Electronic Instrumentation and Measurements, 2nd Ed. (PHI, 2003).
5. R. A. Witte, Electronic Test Instruments, Analog and Digital Measurements, 2nd Ed. (Pearson Education, 2004)
6. Electrical Measurements and Measuring Instruments -2007 by Rajput R.K.
7. Electrical Measurement and Measuring Instruments - E.W Golding & F.C Waddis, 2011.
8. Electrical and Electronics Measurements and Instrumentation by Prithwiraj Purkait, Budhaditya Biswas, Chiranjib Koley -2017
9. https://onlinecourses.nptel.ac.in/noc19_ee44/preview
10. https://instrumentationtools.com/what-is-a-transducer/

COURSE OUTCOMES:

On completion of this course, student will be able to

- Understand the operation of various Instruments.
- Perform experiments to determine various types of errors in measurements.
- Practice for design of testing and measuring set up for electronic systems

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Third Year **CORE PRACTICAL V** **Semester V**

ADVANCED ELECTRONICS LABORATORY

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

COURSE OBJECTIVES:

- To provide the basic knowledge of different type of Modulation and Demodulation Techniques.
- To acquire lab experience of Microcontrollers.
- To get the hands-on experience of Transducers.

(Any twelve (12) Experiments)

(A) COMMUNICATION LABORATORY

1. Study of Amplitude Modulation and Demodulation
2. Study of Frequency Modulation and Demodulation
3. Study of Pulse Amplitude Modulation
4. Study of Pulse width Modulation
5. Study of Pulse Code Modulation
6. AM Transmitter/Receiver
7. FM Transmitter/Receiver
8. Study of ASK,FSK and PSK

(B) MICROCONTROLLER (8051) LABORATORY

9. Perform Arithmetic Operations in 8051 MC
10. Perform Logical Operations in 8051 MC
11. Interface KEY and LED with 8051 MC
12. Interface Solid State Relay with 8051 MC
13. Interface DAC with 8051 MC
14. Interface ADC with 8051 MC
15. Interface Stepper motor with 8051 MC
16. Interface Serial port using RS232.

(C) ELECTRONICS INSTRUMENTATION LAB

17. Study the Characteristics of resistance transducer - Strain Gauge (Measurement of Strain using half and full bridge.)
18. Study the Characteristics of LVDT.
19. Study the Characteristics of Thermistors and RTD.
20. Study the Characteristics of LDR, Photodiode, and Phototransistor: (i) Variable Illumination and (ii) Linear Displacement.
21. Study the Characteristics of one Solid State sensor/Fiber optic sensor

REFERENCES:

1. https://archive.nptel.ac.in/courses/117/106/117106109/
2. Advanced Electronic Communications Systems with Digital Communication Laboratory Manual Using VisSim - 2012 by M. Tavaholi Wayne Tomasi

COURSE OUTCOMES:

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

- Perform experiments relevant with Instrumentation
- Practice for design of testing and measuring set up for electronic communication systems
- Do Programming with Microcontrollers

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Third Year **MAJOR BASED ELECTIVE I** **Semester V**

1. EMBEDDED SYSTEMS

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To introduce Students to the world of Embedded System by learning architectures.
- To acquire knowledge in design hardware and software systems along with the design issues in embedded System.
- To develop skills in embedded based product for self-employment.

UNIT – I Introduction to Embedded Systems:

Embedded system overview - Classification of embedded system - application of embedded- Design challenge- system optimizing overview - Processor Technology - IC Technology - Design Technology

UNIT – II Custom Single-purpose Processors: Hardware:

Combinational Logic - Sequential Logic - Custom Single-purpose processor design - RT-level custom single-purpose processor design - Optimizing custom single purpose processors

UNIT – III General Purpose Processors: Software:

Basic Architecture - Operation - Programmer's view - Development environment - Application-specific instruction-set processors - Selecting a microprocessor - General-purpose processor design

UNIT – IV Peripherals and Interrupts Service Mechanism:

Timers - UART - Pulse Width Modulators - Keypad Controllers -Real Time Clocks - Programmed-I/O Busy-wait Approach without Interrupt Service Mechanism - ISR Concept - Interrupt Sources - Interrupt Servicing Mechanism - Multiple Interrupts -DMA

UNIT – V Communication Case studies:

Communication Basics - Microprocessor Interfacing: I/O Addressing - Interfacing - Direct Memory Access - Arbitration - Multilevel Bus Architectures - Parallel Communication - Serial Communication - Wireless Communication - Serial Protocols: I2C - USB - SPI-Wireless Protocols: IrDA - Bluetooth - IEEE 802.11

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

RTOS and Application: OS vs RTOS - Process Management - Timer Functions - Event Functions - Memory Management - Device, File and IO Subsystems Management - Interrupt Routine in RTOS Environment and Handling of Interrupt Source Calls - RTOS - Basic Design Using an RTOS - RTOS task Scheduling

Models, Interrupt Latency - Case study of Embedded System Design and Coding for Automatic Chocolate vending Machine (ACVM) using RTOS

REFERENCES:

1. F. Vahid and T. Givargis, Embedded System Design - A Unified Hardware / Software Introduction (Wiley, 2015)
2. R. Kamal, Embedded Systems Architecture, Programming and Design (Tata McGraw-Hill, 2010).
3. M. A. Mazidi, S. Naimi and S. Naimi, AVR Microcontroller and Embedded Systems: Using Assembly and C (PHI, 2013)
4. M. Wolf, Computers as Components: Principles of Embedded Computing System Design, (Elsevier, 2012)
5. J. K. Peckol, Embedded System: A Contemporary Design Tool (Wiley, 2019)
6. M. A. Mazidi and J. G. Mazidi, The 8051 Microcontroller and Embedded Systems (Pearson, 2019)
7. Making Embedded Systems: Design Patterns for Great Software (2011) by Elecia White
8. Embedded System Design by Peter Marwedel (2006) Springer
9. https://www.classcentral.com/course/swayam-introduction-to-embedded-system-design-20247
10. https://onlinecourses.nptel.ac.in/noc20_ee98/preview

COURSE OUTCOMES:

On completion of this course, student will be able to

- Explain the concepts related to embedded systems
- Identify and solve hardware and software issued in embedded systems
- Familiarize with peripherals and interrupts connected with embedded systems
- Apply and analyse various protocols applied in embedded systems
- Develop programming skills and design various applications using embedded system

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Third Year **MAJOR BASED ELECTIVE I** **Semester V**

2. INTERNET OF THINGS

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To enable the students to study about Internet of Things and create thirst to emerge as IoT designers
- To understand the technology of IoT and design principles IoT
- To Acquire knowledge of IoT Privacy, Security, Vulnerabilities Solutions and Business Models and Processes

UNIT – I Internet of Things: Overview:

Internet of Things - IoT Conceptual Framework - IoT Architectural View - Technology Behind IoT - Sources of IoT - M2M Communication - Examples of IoT

UNIT – II Design Principles Design Principles for Connected Devices:

IoT/M2M System Layers and Design Standardization - M2M - Difference between IoT and M2M - Communication Technologies - Data Enrichment, Data Consolidation and Device Management at Gateway - Ease of Designing and Affordability.

UNIT – III IoT Connectivity Principles:

Web Connectivity for Connected Devices Network using Gateway - Internet Connectivity - Internet - Based Communication - IP Addressing in the IoT - Media Access Control - Application Layer Protocols: HTTP, HTTPS, ETP, Telnet and Others.

UNIT – IV Sensors, Participatory Sensing, RFID, and Wireless Sensor Networks:

Sensor Technology - Participatory Sensing, Industrial IoT and Automotive IoT - Actuator - Sensor Data Communication Protocols - Radio Frequency Identification Technology - Wireless Sensor Networks Technology

UNIT – V Case studies Illustrating IoT Design:

Home Automation - Smart Lighting - Home Intrusion Detection - Smart Parking - Weather Monitoring System - Air Pollution Monitoring - Forest Fire Detection - Smart Irrigation - IoT Printer

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

IoT Privacy, Security, Vulnerabilities Solutions, Business Models and Processes: Security Models, Profiles and Protocols for IoT - Vulnerabilities, Security Requirements and Threat Analysis - Business Models and Business Model Innovation - Value creation in the IoT - Business Model Scenarios for IoT

REFERENCES:

1. A. Bahga and V. Madisetti , Internet of Things: a Hands-on Approach (University Press, 2018)
2. R. Kamal, Internet of Things: Architecture and Design Principles (Mc Graw Hill Education, 2017)
3. H. Chaouchi, The Internet of Things: Connecting Objects to the Web (Wiley Publication, 2010)
4. O. Hersent, D. Boswarthick, and O. Elloumi, The Internet of Things: Key Applications and Protocols (Wiley Publications)
5. P. Raj and A. C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases, (CRC Press)
6. C. Pfister, Getting Started with The Internet of Things (O'Reilly, 2011)
7. Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry (2016) by Maciej Kranz
8. The Internet of Things (2015) The MIT Press, by Samuel Greengard
9. https://www.edx.org/learn/iot-internet-of-things
10. https://onlinecourses.nptel.ac.in/noc22_cs53/preview

COURSE OUTCOMES:

On completion of this course, student will be able to

- Understand the basic concepts and architecture of IoT System
- Learn the Design Principles for connected Devices
- Apply various protocols for designing IoT systems
- Interface I/O Devices and Sensor Modules
- Develop and Design IoT based real time Projects

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Third Year **SKILL BASED ELECTIVE I** **Semester V**

MOBILE PHONE SERVICING

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To appreciate the importance of embarking on self-employment
- To develop the confidence, basic smart phone system trouble shooting
- To learn cell phone components servicing, comportment diagnostics and testing and inspection.

UNIT – I Basic of Mobile Phones:

Introduction to basic electronics and Architecture and Components of the GSM network, GSM , CDMA - Generations of mobile phones 2G , 3G , 4G and 5G - LTE , WAP , EDGE , UMTS Concepts, Types of networks in cell phones, Dual Band(SIM) Handset

UNIT – II Cell Phone OS and Hand Set feature:

Handset features and applications, working principle of mobile handset a - Components used in mobile handsets. - Tools and equipment used for repairing - Maintenance of mobile handsets, types of power supply and batteries - Troubleshooting basics.

UNIT – III Cell Phone Repairing:

Network problems, Power failure (dead), Mobile phone hardware troubleshooting (water damage, hanging, charging and keypad problems), Handsets assembly - Disassembly, Soldering and de-soldering - SMD rework station.

UNIT – IV Assembling of Cell Phones:

Installation of Drivers - Setting of File Section - Flashing of the Cell Phones - IMEI information - SIM Card problems - Restarting of Dead Cell Phones- Understanding practically the working principle of cell phone- Trouble Shooting methods

UNIT – V Mobile Phone handsets Problems:

Disassembling the cell phone -Testing of Battery, Display, Touch, Antenna, Mic, Speaker, Ringer, Charger, Vibrator and headset - Problems related to mobile phone handsets - replacement of Various components ICS - SMD soldering.

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

Top Mobile technologies: Leading technology trends- Technologies for top brand smart mobiles - E-Commerce and its usage using smart phones - introduction smart phone applications - Psycho-Kinetic Smart Phones - Adequate safety measures to be followed in Smart Phones- Avoiding of Electro Magnetic Radiation on Smart Phones

REFERENCES:

1. C. Oparandu, Mobile Phones and Tablets Repairs: A Complete Guide for Beginners and Professionals
2. M. A. Azeemi, Learn Cell Phone Repair: A Do-It-Yourself Guide
3. Prabhu, Cell Phone Service Training Tamil Book (Chipsystems, 2015)
4. N. Sharma, Troubleshooting of Electronic Devices (Firewall Media Publications, New Delhi)
5. Prabhu, Cell Phone Service Training Tamil Book, CHIPSYSTEMS (2015)
6. Sanjib Pandit, Advance Mobile Repairing: Multicolour Circuits, Service Diagrams & Repairing (2010)
7. Manahr Lotia, Modern Latest Mobile Phone Circuits & Fault Finding (2009)
8. Devratn Agrawal, Advance Mobile Flashing Software, Booksclinic Publishing (2020)
9. https://www.edx.org/learn/mobile-development
10. https://www.udemy.com/topic/cell-phone-repair/

COURSE OUTCOMES:

On completion of this course, student will be able to

- Understand the concepts of GSM/CDMA and to be aware of the call processing of a generation of Mobile technology
- Identify various IC's inside mobile phones and to trained to assemble and disassemble the parts of the mobile phone
- Learn the SMT technology and soldering and de-soldering
- Understand the network problems and SIM card problems and to learn the trouble shooting process
- Diagnose the problem of the mobile phone and understanding possible problem using diagnostic tools and to replacement the required modules

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Third Year	CORE COURSE VIII POWER ELECTRONICS	Semester VI
Code:	(Theory)	Credit: 5

COURSE OBJECTIVES:

- To understand the various kinds of Power Electronic devices.
- To understand the Operation, characteristics and performance parameters of controlled rectifiers.
- To know the Operation, switching techniques and basics topologies of DC-DC switching regulators.
- To understand the Operation of AC voltage controller and various configurations.

UNIT – I Power Semiconductor Devices:

Study of switching devices, SCR, TRIAC, GTO, BJT, MOSFET, IGBT and IGCT- Static characteristics: SCR, MOSFET and IGBT - Triggering and commutation circuit for SCR - Introduction to Driver and Snubber circuits.

UNIT – II Phase-Controlled Converters:

2-pulse, 3-pulse and 6-pulseconverters- Performance parameters -Effect of source inductance- Firing Schemes for converter-Dual converters, Applications - Light dimmer, Excitation system, Solar PV systems.

UNIT – III DC to DC Converters:

Step-up and Step-down Chopper - Control strategy - Introduction to types of choppers - A, B, C, D and E -Switched mode regulators- Buck, Boost, Buck-Boost regulator, Introduction to Resonant Converters, Applications - Battery operated vehicles.

UNIT – IV Inverters:

Single phase and three phase voltage source inverters (both 1200 mode and 1800 mode) - Voltage & Harmonic control - PWM techniques: Multiple PWM, Sinusoidal PWM, Modified sinusoidal PWM - Introduction to space vector modulation - Current source inverter,

UNIT – V AC to AC Converters:

Single phase and Three phase AC voltage controllers - Control strategy - Power Factor Control - Multistage sequence control - single phase and three phase Cyclo converters - Introduction to Matrix converters, Applications - welding .

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

Switching Techniques & Applications: Identify the different types of power semiconductor devices and their switching concepts - Compare the different modulation techniques of pulse width modulated inverters and understand

harmonic reduction methods - analyze the various single phase and three phase power converter circuits and understand their applications.

REFERENCES:

1. M. H. Rashid, Power Electronics: Circuits, Devices and Applications, 3rd Ed. (Pearson Education, New Delhi, 2004).
2. P. S. Bimbra, Power Electronics, 3rd Ed. (Khanna Publishers, 2003).
3. Ahmed, Power Electronics for Technology (Pearson Education Indian Reprint, 2003).
4. J. Vithayathil, Power Electronics, Principles and Applications, 6th Reprint (McGraw Hill Series, 2013).
5. P. T. Krein, Elements of Power Electronics (Oxford University Press, 2004).
6. L. Umanand, Power Electronics Essentials and Applications (Wiley, 2010).
7. J. Gnanavadivel, Power Electronics, 4th Ed. (Anuradha Publications, 2015).
8. M.D. Singh and K.B. Khanchandani, Power Electronics, (Mc Graw Hill India, 2013).
9. https://nptel.ac.in/courses/108105066
10. https://onlinecourses.nptel.ac.in/noc19_ee37/preview

COURSE OUTCOMES:

On completion of this course, student will be able to

- Acquire knowledge about fundamental concepts and techniques used in power electronics.
- Identify basic requirements for power electronics based design application.
- Analyse AC-AC and DC-DC and DC-AC converters.
- Choose the converters for real time applications.

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Third Year	**CORE COURSE IX**	**Semester VI**
	VLSI DESIGN	
Code:	**(Theory)**	**Credit: 5**

COURSE OBJECTIVES:

- To learn MOSFET, CMOS, and VLSI Design
- To understand the knowledge of the Bipolar Logic Circuits and application of CMOS
- To acquire the basic concept of VHDL Programming and Simulation.

UNIT – I Power Semiconductor Devices:

Structure of MOSFET: Enhancement mode MOSFET - Depletion Mode MOSFET - MOS Transistor Theory: Figure of merit - MOS Device design equations - equivalent circuits of MOSFETs - Basic structure of CMOS.

UNIT – II Basic MOS and CMOS, and Bipolar Logic Circuits:

Pass Transistor (or) Transmission gate- Inverters: The n-MOS Inverter - MOSFET as a resistance-determination of pull-up to pull-down ratio for an n-MOS inverter by another n-MOS inverter - pull-up to pull-down ratio for an n-MOS inverter driven through one or more pass transistors - Different forms of pull-up-BICMOS Inverter -Tristate Inverter - Differential Inverter-Bipolar logic circuits - DTL - ECL - Integrated injection logic

UNIT – III Applications of CMOS:

An Increment / Decrement circuit-Shift Registers: Left / Right Register- Serial / Parallel Registers - Comparators for a two bit number - Two Phase non-overlapping clock generator

UNIT – IV VHDL Programming:

VHDL - basic Terminology - Entity Declaration - Architecture body - Configuration Declaration - Package Declaration - Basic Language elements: Identifiers-Data Objects - Data types, Operators: Behavioral Modeling: Entity Declaration - Architecture Body - Process statement - Wait statement - If - Case - Null - Loop - Exit - Next -Multiple Process - Postponed Processes.

UNIT – V Data Flow Modelling:

Concurrent Signal Assignment statement - concurrent verses sequential signal assignment - Multiple drivers - Block Statement - Concurrent Assertion statement - Value of a signal.

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

Simulations: Gate level modelling and simulation - Switch level modelling and simulation - Combinational logic synthesis -Binary decision diagram - Two level logic synthesis.

REFERENCES:

1. D. K. Roy, Principles of VLSI (Galgotia Publication Limited, 2005)
2. Q. Neil and H. E. Weste, Principles of CMOS VLSI Design (Addison-Wesley Publishing Company, 1993)
3. J. M. Rabey, A. Chandrakasan and B. Nikolic, Digital Integrated Circuits: A Design Perspective, 2nd Ed. (Pearson Education India, 2016)
4. D. A. Pucknell and K. Eshraghian, Basic VLSI design, 3rd Ed. (PHI)
5. W. Wolf, Modern VLSI design, 4th Ed. (PHI, 2009)
6. M. Carver and C. Lynn, Introduction To VLSI Systems (BS Publications, 2003)
7. J. M. Rabey, Digital Integrated Circuits (Pearson Education, 2003)
8. S. Brown and Z. Vranesic, Fundamentals of Digital Logic Design with VHDL (Tata McGraw-Hill, 2007).
9. N. H. E. West and K. Eshraghian, Principles of CMOS VLSI Design: A Systems Perspective (Addison Wesley, 2002)
10. https://nptel.ac.in/courses/117106092

COURSE OUTCOMES:

On completion of this course, student will be able to

- Acquire knowledge about fundamental concepts and techniques used in power electronics.
- Identify basic requirements for power electronics based design application.
- Analyse AC-AC and DC-DC and DC-AC converters.
- Acquire skill about simulation software
- Choose the converters for real time applications.

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Third Year **CORE PRACTICAL VI** **Semester VI**

VLSI DESIGN LABORATORY

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

COURSE OBJECTIVES:

- To impart the practical skill so test the VLSI circuits
- To familiarize the students with basic design using VHDL programming skills for analog and digital circuits

(Any twelve (12) Experiments)

(A) DIGITAL DESIGN

1. Design Inverter
2. Design Buffer
3. Design Transmission gate
4. Design Basic gates
5. Design Universal gates (NAND & NOR)
6. Design Encode & Decoder
7. Design (4×1) Multiplexer and De-Multiplexer
8. Design SR Flip-flop
9. Design JK Flip-flop
10. Design D Flip-flop
11. Design T Flip-flop
12. Design 4-bit counters asynchronous counter
13. Design 4-bit counters synchronous counter

(B) ANALOG DESIGN

14. Design Serial port interface using RS232
15. Design Inverter
16. Design Common source amplifier
17. Design Common drain amplifier
18. Design Single stage differential amplifier
19. Design Operational amplifier

REFERENCES:

1. D. A. Pucknell and K. Eshraghian, Basic VLSI design, 3rd Ed. (PHI)
2. https://vlsi-iitg.vlabs.ac.in/MOSFET_simulator.html

COURSE OUTCOMES:

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

- Identify basic requirements for VLSI based design application.
- Analyse various designing methodologies.

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Third Year **MAJOR BASED ELECTIVE II** **Semester VI**

1. BIOMEDICAL ELECTRONICS

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To acquire knowledge on Bio-Medical Instruments, their functions and Applications
- To understand the Specialized Medical Equipment
- To learn the basic concept of Physiological Assisting Devices

UNIT – I Physiological Systems and Bio-Electric Potentials:

Introduction - Cell, Tissues and organs - Various Physiological systems of human body - Half-Cell Potential-Resting and Action Potentials - Bio-Electric Potentials.

UNIT – II Introduction to Bio-Medical Instruments:

Components of Bio-Medical Instruments - Design of Medical Instruments - Electrodes - Types of Electrodes -Transducers - Types of Transducers - Transducers used for medical Applications - Bio-Signal Acquisition: Bridge and Medical Pre-Amplifiers - Filters

UNIT – III Bio-Potential Recorders:

Characteristics of Recording Systems - Electrocardiography (ECG) - Electroencephalography (EEG) - Electromyography – Electro retinography - Phonocardiography

UNIT – IV Physiological Assisting Devices:

Pacemakers - Types of Pacemakers - Defibrillators -Electrotherapy - Nerve and muscle Stimulators - Microwave Diathermy - Heart - Lung Machine - Haemo - Dialysis

UNIT – V Specialised Medical Equipment:

Blood Cell Counter - Electron Microscope - Photometers - Digital - Thermometers - Audiometers - Angiography - X-Ray Machine - Magnetic Resonance Imaging

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

Bio-Telemetry: Introduction - Elements of Bio-Telemetry System - Design of Bio-Telemetry System - Radio Telemetry Systems -Problems in implant telemetry - Uses of Bio-Telemetry

REFERENCES:

1. M. Arumugam, “Biomedical Instrumentation”, 2nd Edition, Anuradha Publications, Reprint 2011.

2. Leslie Cromwell, Biomedical Instrumentation and Measurement, 2nd Ed. (Prentice Hall of India, New Delhi, 2007)
3. R. S. Khandpur, Handbook of Biomedical Instrumentation, 2nd Ed. (Tata McGraw-Hill, New Delhi, 2011)
4. M. Kutz, Standard Handbook of Biomedical Engineering and Design, 1st Ed. (McGraw Hill Publisher, 2003).
5. J. J. Carr and J. M. Brown, Introduction to Biomedical Equipment Technology, 4th Ed. (Pearson Education, 2004)
6. G. S. Sawhney , Biomedical Electronics and Instrumentation made easy (2011)
7. Gowri Nambi, Biomedical Engineering: A Quick Reference Guide (Notion Press, 2019)
8. John G. Webster , Amit J. Nimunkar, Medical Instrumentation, Application and Design (2021)
9. https://nptel.ac.in/courses/108108180
10. https://www.edx.org/course/biomedical-equipment-technician-training-maintenance-repair

COURSE OUTCOMES:

On completion of this course, student will be able to

- Learn the basics of human Physiological Systems
- Acquire knowledge on different Bio-Medical Instruments
- Interpret various Human Assistive devices
- Analyse bio signals and recorders
- Evaluate the performances of specialised Bio-Medical Devices, Design Bio-Medical instruments for various Applications

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Third Year **MAJOR BASED ELECTIVE II** **Semester VI**

2. WIRELESS COMMUNICATION

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To acquire knowledge on Protocols and technologies used in wireless communication
- To understand the knowledge of modern wireless communication systems
- To learn the basic concept of wireless networking, wireless systems and standards

UNIT – I Introduction to Wireless Communication:

Evolution of Wireless Communication - Examples of wireless communication systems - Comparison of wireless communication systems - Trends in Cellular Radio and personal communications - Problems

UNIT – II Modern Wireless Communication Systems:

Second Generation (2G) Cellular Networks- Evolution to 2.5G Wireless Networks-GPRS for 2.5G GSM-Third Generation (3G) Wireless Networks-3G CDMA2000-Wireless Local Loops (WLL) - Wireless Local Area Networks (WLANs)

UNIT – III Mobile Radio Propagation:

Introduction to radio wave propagation - Free Space Propagation Model - Three basic Propagation Mechanisms - Practical Link Budget Design using Path Loss Model-Small Scale Multipath propagation - Small Scale Multipath Measurements - Types of Fading.

UNIT – IV Multiple Access for Wireless Communication:

Multiple access techniques - FDMA - TDMA - Spread spectrum Multiple Access: Frequency Hopped Multiple Access - Code Division Multiple Access - Space Division Multiple Access - Packet Radio Protocols: ALOHA - Slotted ALOHA - Carrier Sense Multiple Access

UNIT – V Wireless Networking:

Introduction - Limitation in Wireless Networking - development of wireless networks - Traffic Routing in wireless networks - Wireless data services- Common Channel Signalling (CCS) - Integrated Services Digital Network (ISDN) - Personal Communication Services - WLAN technology.

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

Wireless Systems and Standards: AMPS - Global System for Mobile - GSM System Architecture - GSM Channel types - CT2 standard for cordless Telephones - Personal Handy phone System - Wireless Cable Television

REFERENCES:

1. T. S. Rappaport, Wireless Communication Principles, 2nd Ed. (Pearson, 2012)
2. G. L. Stuber, Principles of Mobile Communication, 3rd Ed. (Springer India, 2011)
3. Andrea Goldsmith, Wireless Communications (Cambridge University Press; Illustrated edition, 2005).
4. J. Schiller, Mobile Communication, 2nd Ed. (Pearson Education , 2010)
5. A.F. Molisch, Wireless Communications (Wiley, 2005)
6. David Tse, Pramod Viswanath, Fundamentals of Wireless Communication (Cambridge University Press; 2005)
7. Andreas F. Molisch , Wireless Communications, (WSE,2013)
8. https://nptel.ac.in/courses/117105132
9. https://www.edx.org/course/a-system-view-of-communications-from-signals-to-pa
10. https://www.classcentral.com/course/swayam-introduction-to-wireless-and-cellular-communications-14166.

COURSE OUTCOME:

On completion of this course, student will be able to

- Understand the basics of wireless communication systems
- Acquire knowledge on various wireless communication protocols
- Focus on different types of wireless networks
- Compare multiple access techniques for wireless communication systems
- Apply the standards of wireless communication systems.

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Third Year **PROJECT** **Semester-VI**

Code: **Credit: 3**

The candidate shall be required to take up a Project Work by group or individual and submit it at the end of the final year. The Head of the Department shall assign the Guide who, in turn, will suggest the Project Work to the students in the beginning of the final year. A copy of the Project Report will be submitted to the University through the Head of the Department on or before the date fixed by the University.

The Project will be evaluated by an internal and an external examiner nominated by the University. The candidate concerned will have to defend his/her Project through a Viva-voce.

ASSESSMENT/EVALUATION/VIVA VOCE:

1. PROJECT REPORT EVALUATION (Both Internal & External)

   I. Plan of the Project - 20 marks

   II. Execution of the Plan/collection of Data / Organisation of Materials / Hypothesis, Testing etc. and presentation of the report. - 45 marks

   III. Individual initiative - 15 marks

2. Viva-Voce / Internal & External - 20 marks

TOTAL **- 100 marks**

PASSING MINIMUM:

	Vivo-Voce 20 Marks	**Dissertation 80 Marks**
Project	40% out of 20 Marks (i.e. 8 Marks)	40% out of 80 marks (i.e. 32 marks)

A candidate who gets less than 40% in the Project must resubmit the Project Report. Such candidates need to defend the resubmitted Project at the Viva-voce within a month. A maximum of 2 chances will be given to the candidate.

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Third Year | **SKILL BASED ELECTIVE II LAPTOP SERVICING AND TROUBLESHOOTING (Theory)** | **Semester VI**

Code: | **Credit: 2**

COURSE OBJECTIVES:

- To appreciate the importance of embarking on self-employment
- To develop the confidence, installation of all the software's with cope with different operating system
- To master laptop system configuration, conduct diagnostics - testing and inspection.

UNIT – I Basic Electronics:

Basic Electronics - Current, Voltage, AC Current and DC Current - Passive and Active Components -Resistor, Transistor, Capacitor, Diode, Inductor, Integrated Circuit- Series and Parallel Connections - PCB - All the Components Types, Applications and Checking Methods

UNIT – II Laptop Repairing Instruments and Tools:

Multimeter, Soldering and De-soldering techniques - Soldering Iron - Soldering and De-soldering of Components Rework Station (Solder Flux, Soldering paste, De soldering Wick) Soldering station - Hot air Gun -Screw Driver Kit- Nose Pliers

UNIT – III Motherboards and Peripherals:

Introduction of computer Mother Board - Laptop Motherboard - Block diagram of Laptop Motherboard -Motherboard and its parts identification - Various connecter of Motherboard - Peripherals - Assembling and Disassembling of different Laptops

UNIT – IV Operating System and Software Servicing:

Introduction of Operating Systems - Different Types of Operating Systems - various faults arising due to Corrupt Software - Installation of Windows and driver in laptop - Partition -Data Recovery - Bootable USB Drive - OS Installation and Removal of Antivirus

UNIT – V Laptop Serving and Troubleshooting Techniques:

Testing of Various Parts and Components - Fault finding and troubleshooting - Voltage Tracing and different volts used in Laptops - RAM (DDR1, DDR2, DDR3 and DDR4) - Hard disk - BIOS - LCD-TFT Display Section - Battery and Adapter - Repairing Procedure for different Hardware Faults.

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

Working Concept of IC/Chip: Identification of Difference Types of IC - Types of Battery socket Pin Details - BIOS Section Troubleshooting - Internal Parts view of

Display - Types of display problems - (No Back Light, Dim and Dull Screen Blinking Screen Back Light - Black Screen) - Troubleshooting Techniques

REFERENCES:

1. E. Israel, Complete Workbook Guide for Laptop Maintenance and Repair (Kindle Edition)
2. M. Rosenthal, The Laptop Repair Workbook: An Introduction to Troubleshooting and Repairing Laptop Computers
3. M. Scott, Upgrading and Repairing PCs, 9th Ed.
4. A. S. Tanenbaum and D. J. Wetherall, Computer Networks, 5th Ed.
5. Jean Andrews, A+ Guide to Hardware, Managing, Maintaining and Troubleshooting, 6th Ed.
6. N. Sharma, Troubleshooting of Electronic Devices (Firewall Media Publications, New Delhi)
7. S. K. Gupta, Computer Monitor CRT/LCD & TFT Service Manual (GT Publication, Jaipur)
8. https://onlinecourses.swayam2.ac.in/cec20_cs11/preview
9. https://nptel.ac.in/courses/106106092
10. https://www.udemy.com/course/speed-up-your-computer/

COURSE OUTCOMES:

On completion of this course, student will be able to

- Acquire knowledge on electronics components and different parts in laptop technologies
- Understand the different types of Operating Systems and its importance
- Understand the motherboard and Hardware parts
- Diagnose, repair and maintain the laptops according to the standards
- To understand how to solve problems pertaining to viruses and other malicious program

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