Diploma Engineering

Curriculum Structure

(III to VI Semester)

Electronics &Telecommunication Engineering

(EC)

(III to VI Semester)

Semester III

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme corecourse-1	ECPC-301	Principles of Electronic Communication	3	0	0	3	3
2	Programme corecourse-2	ECPC-302	Electronic Devices and Circuits	3	0	0	3	3
3	Programme corecourse-3	ECPC-303	Digital Electronics	2	0	0	2	2
4	Programme corecourse-4	ECPC-304	Electronic Measurements and Instrumentation	3	0	0	3	3
5	Programme corecourse-5	ECPC-305	Electric circuits and network	2	1	0	3	3
6	Programme corecourse-6	ECPC-306	Principles of Electronic Communication Lab	0	0	2	2	1
7	Programme corecourse-7	ECPC-307	Electronic Devices and Circuits Lab	0	0	2	2	1
8	Programme corecourse-8	ECPC-308	Digital Electronics Lab	0	0	2	2	1
9	Programme corecourse-9	ECPC-309	Electronic Measurements and Instrumentation Lab	0	0	2	2	1
10	Summer Internship-I (3 to 4 weeks)after IInd Semester	ECSI-310	Summer Internship-I	0	0	0	0	2
			Total					**20**

Semester IV

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-10	ECPC-401	Microcontroller and Applications	3	0	0	3	3
2	Programme core course-11	ECPC-402	Linear Integrated Circuits	3	0	0	3	3
3	Programme core course-12	ECPC-403	Digital Communication Systems	3	0	0	3	3
4	Programme core course-13	ECPC-404	Microcontroller and Applications Lab	0	0	2	2	1
5	Programme core course-14	ECPC-405	Digital Communication Systems Lab	0	0	2	2	1
6	Programme core course-15	ECPC-406	Linear Integrated Circuits Lab	0	0	2	2	1
7	Programme elective course-1 (Any One to be selected)	ECPE-407/A	Consumer Electronics	3	0	0	3	3
		ECPE-407/B	PCB Design					
		ECPE-407/C	Electronic Equipment Maintenance					
8	Humanities & Social Science-4	HS-408	Professional Skill Development	2	1	0	3	3
9	Project-1	ECPR-409	Minor Project	0	0	4	4	2
10	Mandatory Course-1	AU-410	Essence of Indian Knowledge and Tradition	2	0	0	2	0
			Total					**20**

Semester V

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-16	ECPC-501	Embedded Systems	3	0	0	3	3
2	Programme core course-17	ECPC-502	Mobile and Wireless Communication	3	0	0	3	3
3	Programme core course-18	ECPC-503	Embedded Systems Lab	0	0	2	2	1
4	Programme core course-19	ECPC-504	Mobile and Wireless Communication Lab	0	0	2	2	1
5	Programme core course-20	ECPC-505	Digital System Design Lab	0	0	2	2	1
6	Programme elective course-2 (Any One to be selected)	ECPE-506/A	Microwave and RADAR	4	0	0	4	4
		ECPE-506/B	Optical Communication and Networking					
		ECPE-506/C	Control System and PLC					
7	Programme elective course-3 (Any One to be selected)	ECPE-507/A	Microwave and RADAR Lab	0	0	4	4	2
		ECPE-507/B	Optical Communication and Networking Lab					
		ECPE-507/C	Control System and PLC Lab					
8	Open elective course-1	(Any one to be selected from Annexure-I)		3	0	0	3	3
9	Summer Internship-II (6 weeks) after IV Semester	ECSI-509	Summer Internship-II	0	0	0	0	3
10	Project-2	ECPR-510	Major Project-I	0	0	2	2	1
			Total					**22**

Semester VI

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-21	ECPC-601	Computer Networking and Data Communication	3	0	0	3	3
2	Programme core course-22	ECPC-602	Electronics Simulation Lab	0	0	4	4	2
3	Programme elective course-4 (Any one to be selected)	ECPE-603/A	Medical Electronics	3	0	0	3	3
		ECPE-603/B	VLSI					
		ECPE-603/C	Signal & System					
4	Humanities and Social Science course-5	HS-604	Entrepreneurship and Start-up's	3	1	0	4	4
5	Open elective-2	(Any one to be selected from Annexure-II)		4	0	0	4	4
6	Mandatory Course-2	AU-606	Indian Constitution	2	0	0	2	0
7	Project-3	ECPR-607	Major Project-II	0	0	6	6	3
8	Seminar	ECSE-608	Seminar	2	0	0	2	1
			Total					**20**

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DETAILED SYLLABUS

Semester III

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme corecourse-1	ECPC-301	Principles of Electronic Communication	3	0	0	3	3
2	Programme corecourse-2	ECPC-302	Electronic Devices and Circuits	3	0	0	3	3
3	Programme corecourse-3	ECPC-303	Digital Electronics	2	0	0	2	2
4	Programme corecourse-4	ECPC-304	Electronic Measurements and Instrumentation	3	0	0	3	3
5	Programme corecourse-5	ECPC-305	Electric circuits and network	2	1	0	3	3
6	Programme corecourse-6	ECPC-306	Principles of Electronic Communication Lab	0	0	2	2	1
7	Programme corecourse-7	ECPC-307	Electronic Devices and Circuits Lab	0	0	2	2	1
8	Programme corecourse-8	ECPC-308	Digital Electronics Lab	0	0	2	2	1
9	Programme corecourse-9	ECPC-309	Electronic Measurements and Instrumentation Lab	0	0	2	2	1
10	Summer Internship-I (3 to 4 weeks) after IInd Semester	ECSI-310	Summer Internship-I	0	0	0	0	2
			Total					**20**

Principles of Electronic Communication

Course Code	ECPC-301
Course Title:	Principles of Electronic Communication
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcomes: After the completion of the course, the students will be able to:

1.Apply the Continuous-wave modulation and demodulation techniques used in analog communication.(**K3)**

2. Explain transmitter and receiver circuits.(**K2)**

3. Identify the different sampling and quantization techniques (**K3)**

4. Explain the concepts of PCM, delta and adaptive delta modulation (**K2)**

5. Demonstrate the concept of baseband and passband transmission (**K2)**

6. Apply CDMA and other spread spectrum communication techniques (**K3)**

Course Content:

Module I: ANALOG MODULATION:

No. of lectures: 8

Learning Outcomes: The students on completion of Module I shall be able to:

1. Understand the concepts of frequency translation.
2. Understand the different methods of generating AM signals
3. Understand the concept of demodulation of AM,DSBSC,SSB and VSB signals
4. Learn about the concept of Frequency modulation and demodulation
5. Explain the concept of working of super heterodyne radio receiver.

Content

Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, descriptions of FM signal in time and frequency domains. Super heterodyne radio reciever

Module II: PULSE ANALOG MODULATION:

No. of lectures- 4

Learning outcomes: The students on completion of Module I shall be able to:

1. Understand the concept of sampling and sampling theorem.
2. Understand the concept of pulse analog modulation techniques.
3. Apply the different types of sampling techniques in time and frequency domains.
4. Understand the concepts of aliasing and interpolation.

Content

Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Concepts of PAM, PWM, PPM

Module III: PCM & DELTA MODULATION SYSTEMS:

No. of lectures: 6

Learning Outcomes:the students on completion of Module I shall be able to:

1. Understand the concepts of quantization
2. Explain the concepts of uniform and non-uniform quantization
3. Understand the PCM technique
4. Explain the concept of Delta modulation adaptive delta modulation
5. Compute the Signal to quantization noise ratio in PCM and delta modulation.

Content

Uniform and Non-uniform quantization. PCM and deltamodulation-advantages and disadvantages, adaptive delta modulation. Signal to quantization noise ratio in PCM and delta modulation.

Module IV: DIGITAL MODULATION:

No. of lectures- 6

Learning Outcomes:the students on completion of Module I shall be able to:

1. Understand the concept of Baseband Transmission.
2. Understand the concept of passband transmission.
3. Compare the various line coding techniques.
4. Understand ISI.
5. Conceptualize the concept of geometric interpretation of signals and orthogonalization
6. Compare between the concepts of analog and digital modulation

Content:

Baseband transmission: Line coding (RZ, NRZ), inter symbol interference: spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization.

Module V: SPREAD-SPECTRUM MODULATION:

No. of lectures- 6

Learning Outcomes: the students on completion of Module I shall be able to:

1. Understand the concept of spread-spectrum modulation
2. Understand the concept of direct sequence spread spectrum with coherent BPSK
3. Understand frequency hop spread spectrum
4. Apply the concepts of spread spectrum in communication engineering
5. Understand the concept of CDMA

Content:

Introduction, Pseudo-Noise sequences, direct sequencespread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hopspread spectrum (FHSS). Application of spread spectrum: CDMA.

Books:

1. Principles of communication systems By Taub Schilling, T.M.H.

2. Fundamentals of communication systems By Proakis& Salehi, Pearson education

3. Communication Systems by Simon Haykin, John Wiley

4. Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.

5. Modern Digital & Analog Communication By B.P. Lathi, Oxford Publications

6. Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley

Electronic Devices and Circuits

Course Code	ECPC-302
Course Title	Electronic Devices and Circuits
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcome: -

After completion of the course, students will be able to:

1. Apply PN junction diode to construct power supplies. (K3)
2. Analyze and study the various special purpose diodes (K4).
3. Apply the knowledge of BJT to construct amplifiers. (K3)
4. Imply the concept of amplifier to demonstrate feedback amplifiers topologies (K3).
5. Compare among SCR, DIAC, TRIAC, MOSFET (K4)
6. Illustrate the operation of different types of oscillators (K2)

Course Content:

Unit 1 – Semiconductor and Diodes

No of class hours: 5 to 6 hours

Learning Outcomes: -

Students will be able to

1. Demonstrate types of biasing condition of a diode
2. Construct half and full wave rectifiers using diode
3. Explain the working principles of special types of diode
4. Classify passive filters used with rectifiers.

Content: -

PN Junction Diode – Forward and Reverse Bias Characteristics

Zener Diode – Principle, characteristics, construction, working

Diode Rectifiers – Half Wave and Full Wave

Special diodes- LED, IRLED, photo diode, and laser diode, Point contact diode , Schottky diode. Symbol, operating principle & applications of each.

Filters – C, LC and PI Filters

Unit 2 – Bipolar Junction Transistor (BJT)

No of class hours: 4 to 5 hours

Learning Outcomes: -

Students will be able to

1. Explain the Operation and characteristics of PNP and NPN Transistors. (BJT)
2. Demonstrate the performance characteristics of transistor in CB, CE and CC
3. Classify various types of negative feedback amplifiers.

Content: -

NPN and PNP Transistor – Operation and characteristics

Common Base Configuration – characteristics and working

Common Emitter Configuration – characteristics and working

Common Base Configuration – characteristics and working

High frequency model of BJT

Classification of amplifiers, negative feedback

Unit 3 – Field Effect Transistors

No of class hours: 4 to 5 hours

Learning Outcomes: -

Students will be able to

1. Analyze the basic principle, operation and applications of JFET and MOSFET
2. Construct Common Source Amplifiers using FET
3. Demonstrate the construction and working principle of UJT

Content: -

FET – Working Principle, Classification

MOSFET Small Signal model

N-Channel/ P-Channel MOSFETs – characteristics, enhancement and depletion mode, MOSFET as a Switch

Common Source Amplifiers

Uni-Junction Transistor – equivalent circuit and operation

Unit 4 – SCR DIAC & TRIAC

No of class hours: 4 to 5 hours

Learning Outcomes: -

Students will be able to

1. Explain the construction, operation, working and characteristics of SCR
2. Demonstrate the performance characteristics of DIAC and TRAIC
3. Construct switching circuits using SCR, MOSFET and DIAC
4. Differentiate between SCR, DIAC, TRIAC and MOSFET

Content: -

SCR – Construction, operation, working, characteristics

DIAC - Construction, operation, working, characteristics

TRIAC - Construction, operation, working, characteristics

SCR and MOSFET as a Switch, DIAC as bidirectional switch

Comparison of SCR, DIAC, TRIAC, MOSFET

Unit 5 – Amplifiers and Oscillators

No of class hours: 4 to 5 hours

Learning Outcomes: -

Students will be able to

1. Demonstrate the impact of feedback on different parameters of amplifier
2. Understand various Feedback Amplifier Topologies
3. Explain performance and principals of different types of oscillators.

Content: -

Feedback Amplifiers – Properties of negative Feedback, impact of feedback on different parameters

Basic Feedback Amplifier Topologies: Voltage Series, Voltage Shunt, Current Series, Current Shunt

Oscillator – Basic Principles, Crystal Oscillator, Non-linear/ Pulse Oscillator

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Analog Circuits	A.K. Maini	Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173-584)
2.	Electronic Devices andCircuits	S. Salivahanan and N. Suresh Kumar	McGraw Hill Education; Fourth edition (1 July 2017) ISBN: 978-9339219505
3.	Electronics Devices and circuittheory	Boyestad& Nash- elsky	Pearson Education India; 11 edition (2015) ISBN: 978-9332542600
4.	Electronic Principles	Albert Malvino& David Bates	Tata McGraw Hill Publication 2010 ISBN: 978-0070634244
5.	Electronics Devices &Circuits	Jacob Millman	McGraw Hill Education; 4 edition (2015) ISBN: 978-9339219543

SUGGESTED SOFTWARE/LEARNING WEBSITES:

https://www.electronics-tutorials.ws/

https://www.youtube.com/watch?v=Rx43l-QpeWQ

https://electronicsforu.com/resources/electronic-devices-and-circuit-theory

Digital Electronics

Course Code	ECPC-303
Course Title	Digital Electronics
Number of Credits	2 (L: 2, T: 0, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcome:-

After completion of the course, students will be able to:

C.O. 1: Explain different Number system and simplify the Boolean expressions using K Map**. (K2).**
C.O. 2: Demonstrate the representation of Boolean expression using logic gate.**(K2).**
C.O. 3: Develop different combination logic circuits. **(K3).**
C.O. 4: ConstructSequential Logic Circuits.**(K3).**
C.O. 5: Examine the organization and operation of memory devices. **(K4).**

Course Content:

Module 1 – **Number Systems & Boolean Algebra**(05)

Learning Outcomes:-
Students will be able to

1. Convert from one number system to another.
2. Demonstrate De-Morgan's Theorem.
3. Simplify Boolean expression using K Map.

Content:

Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal. Conversion from one number system to another.
Boolean variables – Rules and laws of Boolean Algebra
De-Morgan's Theorem. Karnaugh Maps and their use for simplification of Boolean expressions.

Module 2 – **Logic Gates**(05)

Learning Outcomes:-

Students will be able to

1. Draw the truth Table of Different Logic gates.
2. Implement Boolean expression using Logic gate.
3. Construct other Logic gate using Universal Logic gate

Content:
Logic Gates – AND, OR, NOT, NAND, NOR , XOR, XNOR: Symbolic representation and truthtable.
Implementation of Boolean expressions and Logic Functions using gates. Simplification of expressions.

Module 3 – Combinational Logic Circuits(05)

Learning Outcomes:-

Students will be able to

1. Construct Different combinational circuits.
2. Implement logic expression using MUX.
3. Explain the application of DMUX.

Content:

Arithmetic Circuits – Addition, Subtraction, 1's 2's Complement, Half Adder, Full Adder, HalfSubtractor, Full Subtractor, Parallel and Series Adders
Encoder, Decoder. Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX. ApplicationsDemultiplexer – 1 to 2 DEMUX, 1- 4 DEMUX, 1- 8 DEMUX

Module 4 – Sequential Logic Circuits(05)
Learning Outcomes:-

Students will be able to

1. Draw the logic diagram of Different Flip-Flop
2. Demonstrate the working principle of Counter
3. Demonstrate the working principle of Shift register

Content:

Flip Flops – SR,JK, T, D, FF, JK-MS, Triggering
Counters – 4 bit Up – Down Counters, Asynchronous/ Ripple Counter, Decade Counter- Mod 3, Mod 7 Counter, Johnson Counter, Ring Counter
Registers – 4bit Shift Register: Serial In Serial Out, Serial in Parallel Out, Parallel In Serial Out,Parallel In Parallel Out

Module 5 – **Memory Devices**(05)

Learning Outcomes:-

Students will be able to

1. Explain the Organization and Characteristics of Different RAM.
2. Explain the Organization and Characteristics of Different ROM.

Content:

Classification of Memories – RAM Organization, Address Lines and Memory Size,Static RAM, Bipolar RAM, cell Dynamic RAM, D RAM, DDR RAM.
Read Only memory – ROM organization, Expanding memory, PROM, EPROM, EEPROM, Flashmemory. Data Converters – Digital to Analog converters, Analog to Digital Converters.

References/ Suggested Learning Resources:-

1. Digital principles &Applications.Albert Paul Malvino& Donald P. Leach McGraw Hill Education; Eighth edition ISBN: 978-9339203405

2. Digital Electronics Roger L. Tokheim Macmillian. McGraw-Hill Education (ISE Editions); International 2 Revised ed edition ISBN: 978-0071167963

3. Digital Electronics – an introduction to theory and practiceWilliam H. Gothmann Prentice Hall India Learning PrivateLimited; 2 edition. ISBN: 978-8120303485

4. Fundamentals of Logic Design. Charles H. Roth Jr. Jaico Publishing House; First edition ISBN: 978-8172247744

5. Digital Electronics R. Anand Khanna Publications, New Delhi(Edition 2018) ISBN: 978-93-82609445

Electronic Measurements and Instrumentation

Course Code	ECPC-304
Course Title	Electronic Measurements and Instrumentation
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Idea of Electrical Circuit Analysis
Course Category	PC

Course Outcomes:

After Completion of the course students would be able to

CO1: Solve for the value of unknown parameter using Bridge circuit (K3).

CO2: Demonstrate the operation of potentiometer in AC and DC networks (K2).

CO3: Understand the use and operation of various electronic instruments (K2).

CO4: Explain the construction and operation of oscilloscope (K2).

CO5: Apply the knowledge of transducer in project implementation (K3).

Unit-I Basics of Measurements and Bridges

Total class hours- 6

Learning Outcomes

After Completion of Unit-I students would be able to

1. Define different types of parameters related to measurement.
2. Calculate the value of unknown parameter by analyzing corresponding Bridge circuit.

Accuracy & precision, Resolution, Types of Errors,
DC Bridges – Wheatstone Bridge, Kelvin Double Bridge,
AC Bridges - Maxwell's Bridge, Hay's Bridge, Anderson Bridge, De-Sauty's Bridge.

Unit-II Potentiometer

Total class hours- 6

Learning Outcomes

After Completion of Unit-II students would be able to

1. Understand the operating principle of potentiometer.
2. Describe the application of potentiometer in electrical circuit.

Basic DC slide wire Potentiometer, Crompton's DC Potentiometer, Applications of DC Potentiometer, AC Potentiometers, Applications of AC Potentiometers.

Unit-IIIMeasuring Instruments

Total class hours- 6

Learning Outcomes

After Completion of Unit-III students would be able to

1. Explain the principle of operation of various measuring instruments.
2. Understand the operation of few frequently used electronic instruments.

Permanent Magnet Moving Coil Instruments (PMMC), Moving Iron type Instruments (MI), Electro Dynamo TypeInstruments, Single Phase EnergyMeter, Electronic Voltmeter and Digital Voltmeter, Electronic Multimeters, Q – Meter, Vector Impedance Meter.

Unit-IVOscilloscopes

Total class hours- 6

Learning Outcomes

After Completion of Unit-IV students would be able to

1. Describe the operation of oscilloscope.
2. Learn to measure various parameters like frequency, time delay, phase angle etc. using oscilloscope.

Cathode ray tube: construction, operation, screens, graticules, Vertical deflection system, Horizontal deflection system, Delay line,Measurement of frequency, time delay, phase angle and modulation index (trapezoidal method),Oscilloscope probe: Structure of 1:1 and 10:1 probe, Multiple Trace CRO.

Unit-V Transducers

Total class hours- 6

Learning Outcomes

After Completion of Unit-V students would be able to

1. Understand the working principles of various transducers.
2. Apply the knowledge of transducer during project work.

Classification, Selection Criteria, Characteristics, Construction, Working Principles and Application of following Transducers:RTD, Thermocouple, Thermistor LVDT, Strain Gauge, Load Cell, Piezoelectric Transducers.

References:

Sl No.	Title of Book	Author	Publication
1.	Electrical & Electronic Measurement & Instruments	A.K. Sawhney	Dhanpat Rai & Sons, India
2.	Electronic Instrument and Measurement Technique	W.D. Cooper	Prentice Hall International, India.
3.	Electronic Measurement &Instrumentation	J.G. Joshi	Khanna Publishing House, Delhi
4.	Measurement systems application and design	E.O. Doebelin and D. N. Manik	The Mcgraw-Hill
5.	Electronic Measurements and Instru- mentation	Oliver and Cage	The Mcgraw-Hill
6.	Basic Electrical Measurement	M.B. Stout	Prentice hall of India, India
7.	Electronic Instrumentation	H. S. Kalsi	The Mcgraw-Hill
8.	Electrical and Electronics Measurement and Instrumentation	Prithwiraj Pukrait, Bud- haditya Biswas, Santanu Das, Chiranjib Koley	The Mcgraw-Hill

Electric Circuits & Network

Course Code	ECPC-305
Course Title	Electric Circuits & Network
Number of Credits	3 (L: 2, T: 1, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcomes:

After Completion of the course students would be able to

CO1: Apply network theorems to design an electrical network (K3).

CO2: Analyze electric network using graph theory (K4).

CO3: Understand the use of frequency domain transformation in electrical circuit analysis (K2).

CO4: Demonstrate the concept of resonance in RLC circuit (K2).

CO5: Identify the values of various network parameters of an electrical circuit (K3).

Unit-I Basics of Network and Network Theorem

Total class hours-6

Learning Outcomes

After Completion of Unit-I students would be able to

3. Analyze an electrical circuit using network theorems.
4. Apply network theorems to design an electrical network.

Node and Mesh Analysis, Superposition Theorem, Thevenin Theorem, Norton Theorem, Maximum Power transfer theorem, Reciprocity Theorem

Unit-II Graph Theory

Total class hours-6

Learning Outcomes

After Completion of Unit-II students would be able to

3. Explain various parameters of graph theory.
4. Analyze electric network using graph theory.

Graph of network, tree, incidence matrix, F- Tie Set Analysis, F-Cut Set Analysis, Analysis of resistive network using cut-set and tie-set, Duality

Unit-IIITime Domain and Frequency Domain Analysis

Total class hours-6

Learning Outcomes

After Completion of Unit-III students would be able to

3. Transform a time domain signal into frequency domain.
4. Understand the use of frequency domain transformation in electrical circuit analysis.

Analysis of electrical circuits using Laplace Transform for standard inputs (unit, Ramp, Step), Steady State and Transient StateResponse, Initial and Final conditions in network elements, time constant, Trigonometric and exponential Fourier series problem, Problem on Fourier Transform

Unit-IVResonance

Total class hours-6

Learning Outcomes

After Completion of Unit-IV students would be able to

3. Know the concept of resonance in RLC circuit.
4. Describe the differences between series and parallel resonance.

Resonance, Q factor, bandwidth, series and parallel resonance, Simple problem.

Unit-V Two Port Network

Total class hours-6

Learning Outcomes

After Completion of Unit-V students would be able to

3. Learn various types of two port parameters.
4. Calculate the values of various network parameters of an electrical circuit.

Two Port Network, Open Circuit Impedance Parameters, Short Circuit AdmittanceParameters,

Hybrid Parameters, TransmissionParameters, Interrelationship of Two Port Network, Inter Connection of Two Port Network

References:

Sl. No.	Title of Book	Author	Publication
1	Networks and Systems	Ashfaq Husain	Khanna Publishing House
2	Network Analysis	M. E. Van Valkenburg	Prentice Hall of India
3	Engineering Circuit Analysis	W. H. Hayt, J. E. Kemmerly and S. M. Durbin	McGraw Hill
4	Electrical Circuits	Joseph Edminister	Schaum's Outline, Tata McGraw Hill
5	Basic Circuit Theory	Lawrence P. Huelsma	Prentice Hall of India
6	Network & Systems	D. Roy Choudhury	Wiley Eastern Ltd
7	Linear Circuit Analysis	De Carlo and Lin	Oxford Press

Principles of Electronic Communication Lab

Course Code	ECPC-306
Course Title:	Principles of Electronic Communication Lab
Number of credits	1 (L: 0, T: 0, P: 2)
Total no. of lecture periods	2
Prerequisites	NIL
Course Category	PC

Course Outcome:-

On completion of the experiments, the Students will be able to:-

C.O.1: Analyse the various forms of Amplitude modulated and demodulated signals (K4)

C.O.2: Analyse the Frequency modulated and demodulated signals. (K4)

C.O.3: Demonstrate the operation of Super Heterodyne Radio receiver. (K2)

C.O.4: Illustrate the various pulse amplitude modulation techniques. (K2)

C.O.5: Summarize Delta modulation through experimentation (K2)

List of experiments (To perform minimum 6 practical).

1. Generation of amplitude modulated signal and calculate the modulation index. Observe overmodulation and critically modulated signal
2. Demodulation of AM signal
3. Generation and demodulation of DSB-SC and SSB signals
4. Modulation and Demodulation of FM signal
5. Study and observe the operation of a super heterodyne receiver
6. Study of sampling and quantization
7. Modulation of a pulse carrier with sinusoidal signal to obtain PWM, PPM,PWM signal and demodulate it.
8. Observe the operation of a PCM encoder and decoder. To consider reason for using digitalsignal x-missions of analog signals.
9. Study of delta modulation signals
10. Study & observe the amplitude response of automatic gain controller (AGC).

List of suggested equipment

1. Amplitude modulation trainer kit
2. Amplitude demodulation trainer kit
3. Frequency modulation-demodulation trainer kit
4. Pulse carrier modulation-demodulation trainer kit
5. PCM encoder trainer kit
6. PCM decoder trainer kit
7. Delta modulation trainer kit
8. Super Heterodyne Radio Receiver trainer kit

Electronic Devices and Circuits Lab

Course Code	:	ECPC-307
Course Title	:	Electronic Devices and Circuits Lab
Number of Credits	:	1 (L: 0, T: 0, P:2)
Prerequisites	:	NIL
Course Category	:	PC

Course Outcome: -

Students will be able to:-

CO1: Demonstrate construction & characteristics of diodes (K2).

CO2: Apply diode to construct various types of rectifier circuit (K3).

CO3: Experiment with different types of rectifiers using simulator (K3).

CO4: Analyse the characteristics of DIAC and TRAIC (K4).

CO5: Construct various feedback amplifier and Compare the results with simulation model (K3).

PRACTICALS/ EXERCISES:

S. No.	List of experiments (minimum six experiments to be performed)
1.	Construct the circuit and plot the VI characteristics of the PN Junction Diode, find the cut in voltage
2.	Construct the circuit and plot the characteristics of a Zener Diode. Find the breakdown voltage
3.	Construct a Half Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results
4.	Construct a Full Wave Rectifier and obtain regulation characteristics – Without Filters and with Filters Compare the results
5.	Construct a Bridge Rectifier and obtain regulation characteristics – Without Filters and with Filters
6.	Obtain the characteristics of DIAC and TRIAC

7.	Simulate half wave, full wave and bridge rectifier using simulation tool like PSpice/ Orcad/ Multisim.
8.	Develop a simulation model for Voltage Series and Voltage Shunt Feedback Amplifiers
9.	Develop circuits for Voltage Series and Voltage Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.
10.	Develop a simulation model for Current Series and Current Shunt Feedback Amplifiers
11.	Develop circuits for Current Series and Current Shunt Feedback Amplifiers and obtain output plots. Compare the results with the simulation model.

Reference Books:

S. No.	Title of Book	Author	Publication
1.	Analog Circuits	A.K. Maini	Khanna Publishing House Ed. 2018 (ISBN: 978-93-86173-584)
2.	Electronic Devices and Circuits	S. Salivahanan and N. Suresh Kumar	McGraw Hill Education; Fourth edi- tion (1 July 2017) ISBN: 978-9339219505
3.	Electronics Devices and circuit theory	Boyestad& Nash- elsky	Pearson Education In- dia; 11 edition (2015) ISBN: 978-9332542600
4.	Electronic Principles	Albert Malvino& Da- vid Bates	Tata McGraw Hill Publication 2010 ISBN: 978-0070634244
5.	Electronics Devices & Circuits	Jacob Millman	McGraw Hill Education; 4 edition (2015) ISBN: 978-9339219543

Digital Electronics Lab

Course Code	ECPC-308
Course Title	Digital Electronics Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	PC

Course Outcome:-

After completion of the course, students will be able to:

C.O. 1: Demonstrate the truth tables verification for all logic gates.**(K2).**
C.O. 2: Build of combinational logics circuit and logic circuits with Logic Gates.**(K3).**
C.O. 3: Illustrate the truth table verification of combinational Logic Circuit using dedicated ICs.**(K2).**
C.O. 4: Experiment with all Flip Flop and verify their truth tables.**(K3).**
C.O. 5: Construct controlled shift registers and Counter.**(K3).**
C.O. 6: Model an Analog to Digital Converter and a Digital to Analog Converter in Software (such as PSpice). **(K4).**

List of Practical's/ Activities ***(To perform minimum 6 practical).***

1. To verify the truth tables for all logic gates – NOT OR AND NAND NORXOR XNOR using CMOS Logic gates and TTL Logic Gates
2. Implement and realize Boolean Expressions with Logic Gates
3. Implement Half Adder, Full Adder, Half Subtractor, Full subtractor usingICs
4. Implement parallel and serial full-adder using ICs
5. Design and development of Multiplexer and De-multiplexer using multiplexer
6. Verification of the function of SR,D, JK and T Flip .
7. Design controlled shift registers.
8. Construct a Single digit Decade Counter (0-9) with 7 segment display.
9. To design a programmable Up-Down Counter with a 7 segment display.
10. Study of different memory ICs.
11. Study Digital- to – Analog and Analog to Digital Converters.
12. Simulate in Software (such as PSpice) an Analog to Digital Converter.
13. Simulate in Software (such as PSpice) an Digital to Analog Converter.

Reference Books:
1. Digital principles & Applications. Albert Paul Malvino& Donald P. Leach. McGraw Hill Education; Eighth edition. ISBN: 978-9339203405
2. Digital Electronics .Roger L. TokheimMacmillian. McGraw-Hill Education (ISE Editions); International 2 Revised ed edition .ISBN: 978-0071167963
3. Digital Electronics – anintroduction to theoryand practice. William H. GothmannPrentice Hall India Learning PrivateLimited; 2 edition. ISBN: 978-8120303485
4. Fundamentals of LogicDesign. Charles H. Roth Jr. Jaico Publishing House; First edition ISBN: 978-8172247744
5. Digital Electronics R. Anand Khanna Publications, New Delhi(Edition 2018) ISBN: 978-93-82609445

Electronic Measurements and Instrumentation Lab

Course Code	ECPC-309
Course Title	Electronic Measurements and Instrumentation Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Nil
Course Category	PC

Course Outcome:-

Students will be able to:-

C.O.1: Demonstrate the measurement of inductance and resistance using bridges (K2)

C.O.2: Demonstrate the calibration of ammeter, voltmeterand single phase energy meter (K2)

C.O.3: Illustrate the working of Q-meter, CRO and DSO (K2)

C.O.4: Experiment with temperature sensors, LVDT and load cells (K3)

List of Experiments ***(To perform minimum 6 practical).***

1. Measure unknown inductance using following bridges (a) Anderson Bridge (b) Maxwell Bridge
2. Measure Low resistance by Kelvin's Double Bridge
3. Calibrate an ammeter using DC slide wire potentiometer
4. Calibrate a voltmeter using Crompton potentiometer
5. Measure low resistance by Crompton potentiometer

6. Calibrate a single-phase energy meter by phantom loading
7. Study the working of Q-meter and measure Q of coils
8. Study working and applications of (i) C.R.O. (ii) Digital Storage Oscilloscope
9. Measurement of displacement with the help of LVDT
10. Draw the characteristics of the following temperature transducers (a) RTD (Pt-100) (b) Thermistor.
11. Measurement of strain/force with the help of strain gauge load cell

List of equipment:

1) Anderson's Inductance Bridge Experiment Board and Trainer Kit

2) Maxwell's Inductance Bridge Experiment Board and Trainer Kit

3) Trainer Kit for Measurement of low resistance by Kelvin's Double Bridge

4) Trainer kit Crompton DC Potentiometer Calibration of PMMC Ammeter & Voltmeter.

5) Single phase energy meter.

6) Trainer kit for strain gauge

7) Trainer kit for LVDT

8) Trainer kit for LCQ meter.

9) Colour Digital storage oscilloscope and two channel Analog Oscillator.

10) Temperature measurement trainer kit along with i) RTD ii) Thermistor iii) Thermocouple.

Summer Internship-I

Course Code	ECSI-310
Course Title	Summer Internship-I
Number of Credits	2 (L: 0, T: 0, P: 0)
Prerequisites	Nil
Course Category	Summer Internship

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time during the academic session.

Sl. no.	Schedule	Duration	Activities	Credits	Hours of Work
1	Summer Vacation after 2nd Semester	3-4 Weeks	Inter/ Intra Institutional Activities **	2	80 Hours

(** Students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective Institutions; contribution at incubation/ innovation /entrepreneurship cell of the Institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the Institutes and Participation in all the activities of Institute's Innovation Council for e.g.: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.)

Benefits to Students:

1. An opportunity to get hired by the Industry/ organization.
2. Practical experience in an organizational setting.
3. Excellent opportunity to see how the theoretical aspects learned in classes are integrated into the practical world. On-floor experience provides much more professional experience which is often worth more than classroom teaching.
4. Helps them decide if the industry and the profession is the best career option to pursue.
5. Opportunity to learn new skills and supplement knowledge.
6. Opportunity to practice communication and teamwork skills.
7. Opportunity to learn strategies like time management, multi-tasking etc. in an industrial setup.
8. Opportunity to meet new people and learn networking skills.
9. Makes a valuable addition to their resume.
10. Enhances their candidacy for higher education.
11. Creating network and social circle and developing relationships with industry people.
12. Provides opportunity to evaluate the organization before committing to a full-time position.

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Explain the real life organizational and industrial environment situations (K2).

C.O.2: Develop organizational dynamics in terms of organizational behaviour, culture and professional ethics (K1).

C.O.3: Understand the importance of Team work (K2).

C.O.4: Explain invaluable knowledge and networking experience (K2).

C.O.5: Develop skill to build a relationship with a prospective employer (K3).

Course Content:-

Internships are educational and career development opportunities, providing practical experience in a field or discipline. The Summer Internship-I is a student centric activity that would expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated, non-compensated or some time may be paid. The internship has to be meaningful and mutually beneficial to the intern and the organization. It is important that the objectives and the activities of the internship program are clearly defined and understood. Following are the intended objectives of internship training:

1. Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Exposure to the current technological developments relevant to the subject area of training.
4. Experience gained from the 'Industrial Internship' in classroom will be used in classroom discussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Learn to apply the Technical knowledge in real industrial situations.
7. Gain experience in writing Technical reports/projects.
8. Expose students to the engineer's responsibilities and ethics.
9. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
10. Promote academic, professional and/or personal development.
11. Expose the students to future employers.
12. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations

13. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Overall compilation of Internship Activities / Credit Framework:

Major Head of Activity	Credit	Schedule	Total Duration	Sub Activity Head	Proposed Document as Evidence	Evaluated by	Performance appraisal/ Maximum points/ activity
Inter/ Intra Institutional Activities	2	Summer Vacation after 2nd Semester	3-4 Weeks	Inter/ Intra Institutional Workshop/ Training	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Working for consultancy/ research project	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Festival (Technical / Business / Others) Events	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Contribution in Incubation/ Innovation/ Entrepreneurship Cell/ Institutional Innovation Council	Certificate	Cell In-charge	Satisfactory/ Good/ Excellent
				Learning at Departmental Lab/Tinkering Lab/ Institutional workshop	Certificate	Cell In-charge	Satisfactory/ Good/ Excellent

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed at the end of each day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and get ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

a) Regularity in maintenance of the diary.
b) Adequacy & quality of information recorded.
c) Drawings, sketches and data recorded.
d) Thought process and recording techniques used.
e) Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

a) Originality.
b) Adequacy and purposeful write-up.
c) Organization, format, drawings, sketches, style, language etc.
d) Variety and relevance of learning experience.
e) Practical applications, relationships with basic theory and concepts taught in the course.

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SEMESTER IV

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-10	ECPC-401	Microcontroller and Applications	3	0	0	3	3
2	Programme core course-11	ECPC-402	Linear Integrated Circuits	3	0	0	3	3
3	Programme core course-12	ECPC-403	Digital Communication Systems	3	0	0	3	3
4	Programme core course-13	ECPC-404	Microcontroller and Applications Lab	0	0	2	2	1
5	Programme core course-14	ECPC-405	Digital Communication Systems Lab	0	0	2	2	1
6	Programme core course-15	ECPC-406	Linear Integrated Circuits Lab	0	0	2	2	1
7	Programme elective course-1 (Any One to be selected)	ECPE-407/A	Consumer Electronics or	3	0	0	3	3
		ECPE-407/B	PCB Design					
		ECPE-407/C	Electronic Equipment Maintenance					
8	Humanities & Social Science-4	HS 408	Professional Skill Development	2	1	0	3	3
9	Minor Project	ECPR-409		0	0	4	4	2
10	Mandatory Course-1	AU-410	Essence of Indian Knowledge and Tradition	2	0	0	2	0
			Total					**20**

Microcontroller and Applications

Course Code	ECPC-401
Course Title	Microcontroller and Applications
Number of Credits	3 (L:3, T:0, P: 0)
Prerequisites	Digital Electronics
Course Category	PC

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Explain the internal architecture of 8085, 8086 processor and 8051 microcontroller. (K2)
C.O.2: Execute assembly language program for 8051microprocessor. (K3)
C.O.3: Apply programming knowledge to interface hardware with 8051.(K3)
C.O.4: Apply C programming to interface Internal and external hardware with 8051.(K3)
C.O.5: Explain the architecture of ARM processor.(K2)

Module I :Introduction (6)

Learning Outcomes:
Students will be able to:

1. Classify Microprocessors and Microcontrollers.

2.Explain the internal architecture of 8085, 8086 processor and 8051 microcontroller.

Content:
Introduction to Microprocessors and Microcontrollers, Architectures [8085, 8086] Intel MCS- 51 family features – 8051 -organization and architecture.

Module II: **Programming with 8051 (6)**

Learning Outcomes:

Students will be able to:
1. Understand assembly language program by using 8051 Instruction sets and addressing modes.

2. Execute internal peripheral devices using assembly level code.

Content:
8051 instruction set, addressing modes, conditional instructions, I/O Programming, Arithmetic logic instructions, single bit instructions, interrupt handling, programming counters, timers and Stack

Module III: Interfacing of 8051 with Hardware. (6)

Learning Outcomes:
Students will be able to:
1. Understand the interfacing of external peripheral with 8051.

Content:
MCS51 and external Interfaces 8 User interface – keyboard, LCD, LED, Real world interface - ADC, DAC, SENSORS Communication interface.

Module IV: C programming with 8051 (6)

Learning Outcomes:
Students will be able to:

1. Understand C programming language for 8051
2. Apply c language for interfacing internal and external Peripheral.

Content:
8 I/O Programming, Timers/counters, Serial Communication, Interrupt, User Interfaces-LCD, Keypad, LED and communication interfaces [RS232].

Module V: Introduction to RISC Processor. (6)

Learning Outcomes:
Students will be able to:

1. Explain the internal architecture of ARM processor.

Content:
ARM processor core based microcontrollers 14 Need for RISC Processor-ARM processor fundamentals, ARM core based controller [LPC214X], IO ports, ADC/DAC, Timers.

References:
1. The 8051 Micro Controller and Embedded Systems. Muhammad Ali, Mazidi& Janice GilliMazidi, R.D.Kinely. PHI Pearson Education, 5th Indian reprint

2. Microprocessor and Microcontrollers Krishna Kant Eastern Company Edition, Prentice Hall of India, New Delhi

3. Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086, 8051. Soumitra Kumar Mandal.Mc Graw Hill Edu,
4. Microcontrollers: Architecture implementation and Programming Tabak Daniel, Hintz Kenneth j. Tata McGraw Hill, 2007
5. ARM Developer's Guide.UM10139LPC214X User manual – Rev.4. Andrew N.Sloss, Dominic Symes, Chris Wright User manual – Rev.4
6. Microprocessors and interfacing: programming and hardware Douglas V. Hall Tata McGraw Hill, 2editon, 2007.
7. "Microcontroller – Fundamentals and Applications with Pic.Valder – Perez Yeesdee Publishers, Tayler & Francis.

Linear Integrated Circuits

Course Code	ECPE-402
Course Title	Linear Integrated Circuits
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Electronic Devices and Circuits
Course Category	PE

Course Objectives: After completing the course, the students will able to:-

CO 1: Demonstrate the concept of IC fabrication and analysis of circuits based on linear IC. (K2)
CO 2: Illustrate the operational amplifier and its application. (K2)
CO 3: Explain analog multiplier and PLL and demonstrate different applications based on it. (K2)
CO 4: Distinguish the working principle of various data converters. (K4)
CO 5: Identify the needs of voltage regulators and timers. (K3)

Module I - IC Fabrication and Circuit Configuration for Linear IC (7 hours)

Learning Outcomes:-

Students will be able to

1) Be familiar with the different IC fabrication.
2) Understand the circuit configuration for linear IC.
3) Be familiar with the basic concept and characteristics of operational amplifier.

Advantages of ICs over discrete components – Manufacturing process of monolithic Ics Construction of monolithic bipolar transistor – Monolithic diodes – Integrated Resistors Monolithic Capacitors– Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages-and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

Module II - Applications of Operational Amplifiers (7 hours)

Learning Outcomes:-

Students will be able to

1) Understand the operational amplifier and its applications.
2) Explain the operation of different applications in operational amplifier.

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, substractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

Module III - Analog Multiplier and PLL (7 hours)

Learning Outcomes:-

Students will be able to

1) Understand the concept of analog multiplier.
2) Explain the operation of different applications in analog multiplier.
3) Understand the operation of different applications PLL.

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

Module IV- Analog to digital and digital to analog converters (7 hours)

Learning Outcomes:-

Students will be able to

1) Understand the basic concepts of data conversion.
2) Analyse and design data conversion circuits.

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R2R 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.

Module V - Waveform generators and special function (7 hours)

Learning Outcomes:-

Students will be able to

1) Understand the basic concepts of timer circuit.
2) Design of different waveform using multivibrator.
3) Demonstrate the design of power supply circuits.

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator,ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

References:

1. Design with operational amplifiers and analog integrated circuits, 3rd Edition, Author- Sergio Franco, Publication- Tata McGraw-Hill, 2007.
2. Linear Integrated Circuits, Author- D.Roy Choudhry, Shail Jain, Publication- New Age International Pvt. Ltd.
3. System design using Integrated Circuits, Author- B.S.Sonde, Publication- New Age Pub, 2nd Edition, 2001
4. Analysis and Design of Analog Integrated Circuits, Author-Gray and Meyer, Publication- Wiley International, 2005.
5. OP-AMP and Linear ICs, Author- Ramakant A.Gayakwad, Publication- Prentice Hall / Pearson Education,4th Edition, 2001.
6. Operational Amplifier and Linear Integrated Circuits, Author- K Lal Kishore, Publication- Pearson Education, 2006.

Digital Communication Systems

Course Code	ECPC-403
Course Title:	Digital Communication Systems
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Basics of Electronic Communication
Course Category	PC

Course Outcomes: After completing the course, the students will be able to

C.O.1: Explain digital communication system andbasic principles of digital communication signals (K2).

C.O.2: Explain various Noises present in digital communication. Students will also able to compare role of filters to eliminate noise (K2).

C.O.3: Apply Error analysis technique inDigital modulation (K3).

C.O.4: Define various entropies and capacity theorem of Information Theory (K1).

C.O.5: Construct various coding and decoding techniques in digital communication (K3).

Course Contents:

Module 1: Introduction and principle of digital communication **No. of lectures:**6

Learning Outcomes: Students will be able to learn and explain

1. Various blocks required and function of each block in digital communication system.
2. Sampling and quantization of signals.
3. Various Line coding techniques.
4. PCM TDM hierarchies.

Block diagram and sub-system description of a digital communication system. Sampling of low-pass and band-pass signals, PAM, PCM, signal to quantization noise ratio analysis of linear and nonlinear quantizers, Line codes and bandwidth considerations; PCM TDM hierarchies, frame structures, frame synchronization and bit stuffing.

Module 2: Noise and filters **No. of lectures**: 6

Learning Outcomes: Students will be able to learn and explain

1. Quantization noise analysis of various digital modulation techniques.
2. Low bit rate coding, correlative coding methods.
3. Performance of matched filter and roll-off filters.

Quantization noise analysis of DM and ADM; DPCM and ADPCM; Low bit rate coding of speech and video signals. Baseband transmission, matched filter, performance in additive Gaussian noise; Inter-symbol interference (ISI), Nyquist criterion for zero ISI, sinusoidal roll-off filtering, correlative coding, equalizers and adaptive equalizers; Digital subscriber lines.

Module 3: Error analysis inDigital modulation Techniques **No. of lectures**: 8

Learning Outcomes: Students will be able to learn and apply

1. Geometric representation of signals.
2. Generation, detection and probability of error analysis of digital modulation schemes.
3. Comparison of bandwidth and bit rate of digital modulation schemes.

Geometric representation of signals; maximum likelihood decoding; Correlation receiver, equivalence with matched filter. Generation, detection and probability of error analysis of OOK, BPSK, coherent and non-coherent FSK, QPSK and DPSK; QAM, MSK and multicarrier modulation; Comparison of bandwidth and bit rate of digital modulation schemes.

Module 4: Introduction to Information Theory**No. of lectures:**4

Learning Outcomes: Students will be able to define

1. Information measures, Entropy and types of entropy.
2. Capacity theorem, point to point channel, discrete and continuous alphabets.

Information Theory: information measures, Shannon entropy, differential entropy, mutual information, capacity theorem for point-to-point channels with discrete and continuous alphabets.

Module 5: Introduction to Coding Theory**No. of lectures**: 6

Learning Outcomes: Students will be able to construct

1. Linear block codes, hamming codes, Convolution codes, Turbo codes and LDPC codes.
2. Soft versus hard decision decoding.

Linear block codes – definitions, properties, bounds on minimum distance (singleton, Hamming, GV, MRRW), soft versus hard decision decoding, some specific codes (Hamming, RS, Concatenated); Convolutional codes – structure, decoding (the Viterbi and BCJR algorithms); Turbo codes, LDPC codes.

References:

S. No.	Title of Book	Author	Publication
1	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2	Modern Digital and Analog	Lathi, B.P. and Ding,	Intl. 4th Ed., Oxford

	Communication Systems	Z	University Press.
3	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
4	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K	2nd Ed., Dorling Kindersley
5	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley
6	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall

Microcontroller and Applications Lab

Course Code	:	ECPC-404
Course Title	:	Microcontroller and Applications Lab
Number of Credits	:	1 (L: 0, T:0 P: 2)
Prerequisites	:	Digital Electronics
Course Category	:	PC

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: DevelopAssembly languageand C language program and implement in the flash memory of 8051.(K3)
C.O.2. Apply Arithmetic and logical instructions in programs.(K3)
C.O.3: Compare and sorting the group of data using Assembly language .(K4)
C.O.4: Apply Assembly and C language for Programming Interrupts. (K3)
C.O.5: Apply Assembly and C language to interface external and internal peripheral device.(K3)

Course Content:

1. Programming 8051 Micro controller using ASM and C, and implementation in flash 8051 microcontroller.
2. Programming with Arithmetic logic instructions [Assembly]
3. Program using constructs (Sorting an array) [Assembly]
4. Programming using Ports [Assembly and C]
5. Delay generation using Timer [Assembly and C]
6. Programming Interrupts [Assembly and C]
7. Implementation of standard UART communication (using hyper terminal) [Assembly and C].

8. Interfacing LCD Display. [Assembly and C]
9. Interfacing with Keypad [Assembly and C]
10. Programming ADC/DAC [Assembly and C]
11. Interfacing with stepper motor. [Assembly and C]
12. Pulse Width Modulation. [Assembly and C] Programming ARM Micro controller using ASM and C using simulator.

11.Programming with Arithmetic logic instructions[Assembly]
13. GPIO programming in ARM microcontroller. [C Programming].
14. Timers programing in ARM Microcontroller. [C Programming].

References:

1. The 8051 Micro Controller and Embedded Systems. Muhammad Ali Mazidi& Jan ice Gilli Mazidi, R.D.Kinely. PHI Pearson Education, 5thIndian reprint.

2. Microprocessor and Microcontrollers, Krishna Kant, Eastern Company Edition, Prentice Hall of India, New Delhi

3. Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051, Soumitra Kumar Mandal, McGraw Hill Edu,

4. Microcontrollers: Architecture implementation and Programming, Tabak Daniel, Hintz Kennethj, Tata McGraw Hill, 2007.

5. manual – Rev.4, Andrew N.Sloss, Dominic Symes, Chris Wright, User manual – Rev.4

6. Microprocessors and interfacing: programming and hardware, Douglas V. Hall, Tata McGraw Hill, 2editon,2007

7. Valder – Perez, Yeesdee Publishers, Tayler &Francis,Yeesdee Publishers, Tayler & Francis

Digital Communication Systems Lab

Course Code	ECPC-405
Course Title:	Digital Communication Systems Lab
Number of credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	PC

Course Outcomes: Students will be able to

C.O.1: Experiment with various types of digital modulation circuits. (K3).

C.O.2: Construct the model of different digital modulation techniques and experiment using software simulation (K3).

C.O.3: Examining Performance Analysis of Band Pass Signal Transmission and Reception (K4).

C.O.4: Experiment with various digital modulation keying techniques using hardware circuit in trainer kit (K3).

C.O.5: Experiment with Time Division Multiplexing using IC (K3).

Course Contents:

List of Experiments (To be perform minimum 6 practical)

1. Pulse Code Modulation and Differential Pulse Code Modulation.
2. Delta Modulation and Adaptive Delta modulation.
3. Simulation of Band Pass Signal Transmission and Reception • Amplitude Shift Keying • Frequency Shift Keying • Phase Shift Keying.
4. Performance Analysis of Band Pass Signal Transmission and Reception • Amplitude Shift Keying • Frequency Shift Keying • Phase Shift Keying.
5. Implementation of Amplitude Shift Keying
6. Implementation of Frequency Shift Keying
7. Implementation of Phase Shift Keying.
8. Time Division Multiplexing: PLL (CD 4046) based synch, clock and data extraction

Equipment and software Requirements:

1. Digital communication Trainer kit for PCM, DPCM.
2. Delta, Adaptive delta Modulation & Demodulation.
3. Trainer kit for Performance Analysis of Band Pass Signal Transmission and Reception of various keying techniques.
4. Trainer kit for various keying techniques.
5. Trainer kit for PLL (CD 4046) based synch, clock and data extraction.
6. Matlabsimulink with communication tool box.

References:

S. No.	Title of Book	Author	Publication
1	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl. 4th Ed., Oxford University Press.
3	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
4	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K	2nd Ed., Dorling Kindersley
5	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley
6	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall

LINEAR INTEGRATED CIRCUITS LAB

Course Code	ECPC-406
Course Title	Linear Integrated Circuits Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	PE

Course Objectives: After completing the course, the students will able to:-

CO 1: Apply Op-Amp to develop Adder, Subtractor, Waveform generator and active filters. (K3)
CO 2: Develop Timer IC 555 based applications (K3)
CO 3: Experiment with PLL ICs (K3)
CO 4: Make use of data converters for signal transformation. (K3)
CO 5: Develop regulators using ICs. (K3)

List of Experiments (To be perform minimum 6 practical)

Design and implementation of following experiments by using Virtual Software platform or equivalent hardware platform.

1. Study of Operational Amplifiers (IC741)-Characteristics.
2. Apply OpAmp as Summing and Difference Amplifier Circuit.
3. Design Integrator and differentiator using OpAmp.
4. Waveform Generation using Op-Amp (IC741).
5. Design of Active filters using Op-Amp (IC741).

6. Applications of Timer IC555.
7. Study and application of PLL IC's.
8. Study of DAC and ADC.
9. Op-Amp voltage Regulator- IC 723.

Consumer Electronics

Course Code	ECPE-407/A
Course Title:	Consumer Electronics
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PE

Course Outcomes: After the completion of the course, the students will be able to:

1.Understand the concept of acoustic fundamentals. K2

2. Explain the concept of audio systems. K2

3. Outline the concept of monochrome and colour TV standards. K2

4. Illustrate the concept of television receiver and video systems. K2

5. Summarize the working and application of consumer appliances. K2

Course Content:

Module-I Audio Fundamentals and Devices

No. of lectures: 6

Suggestive Learning Outcomes: The students on completion of Module I shall be able to:

1.Understand the concepts of sound signal and acoustic measurement.

2.Explain the principle and working of microphone

3.Illustrate the working principle of different speakers

4.Summarize the concept of sound recording.

Content:

Basic characteristics of sound signal, Audio level metering, decibel level in acoustic measurement. Microphone & Types, speaker types & working principle, Sound recording principle & types

Module-II Audio Systems

No. of lectures: 6

Suggestive Learning Outcomes: The students on completion of Module II shall be able to:

1.Understand the concept of home theatre sound system.

2.Illustrate the working principle and working of digital console.

3.Demonstrate the working of FM tuner.

4.Explain about the PA system.

Content:

CD player, home theatre sound system, surround sound, Digital console block diagram, working principle, applications, FM tuner , ICs used in FM tuner TDA 7021T , PA address system.

Module-III Television Systems-

No. of lectures: 6

Suggestive Learning Outcomes: The students on completion of Module III shall be able to:

1.Summarize the monochrome TV standards.

2.Illustrate about colour TV standards.

3.Explain the colour theory and characteristics.

4.Understand the working of TV camera.

Content:

Monochrome TV standards, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution, Composite video signal, Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance, Different types of TV camera, Transmission standards

Module-IVTelevision Receivers and Video Systems

No. of lectures: 6

Suggestive Learning Outcomes: The students on completion of Module IV shall be able to:

1.Classify the working principle of television receivers.

2.Understand the working principle of digital TV.

3. Explain the working of DTH receiver.

4.Understand about multimedia interface.

Content:

Television Receivers and Video Systems PAL-D colour TV receiver, Digital TVs:- LCD, LED,PLASMA, HDTV, 3-D TV, projection TV, DTH receiver, Video interface, Digital Video, SDI, HDMI Multimedia Interface , Digital Video Interface

Module-V Home / Office Appliances

No. of lectures: 6

Suggestive Learning Outcomes: The students on completion of Module V shall be able to:

1.Understand the working principle of FAX.

2.Demonstrate the working principle of home appliances.

3. Explain the working of digital camera and cam coder.

Content:

Diagrams, operating principles and controller for FAX and Photocopier, Microwave Oven, Washing

Machine, Air conditioner and Refrigerators, Digital camera and cam coder.

Suggested References:

1. Consumer Electronics Bali S.P. Pearson Education India,2010 , latest edition

2. Audio video systems : principle practices & troubleshooting Bali R and Bali S.P Khanna Book Publishing Co. (P) Ltd., 2010Delhi , India, latest edition 3.

Modern Television practices Gulati R.R. New Age International Publication (P) Ltd. New Delhi Year 2011, latest edition

4. Audio video systems Gupta R.G. Tata Mc graw Hill, New Delhi, India 2010, latest edition

5. Mastering Digital Television Whitaker Jerry & Benson Blair McGraw-Hill Professional, 2010, latest edition

6. Standard handbook of Audio engineering Whitaker Jerry & Benson Blair McGraw-Hill Professional, 2010 , latest

PCB Design

Course Code :	ECPE-407/B
Course Title :	PCB Design
Number of Credits :	3(L: 3, T: 0, P: 0)
Prerequisites :	Electronic Device & Circuit
Course Category :	PE

After the completion of the course students will be able to:

CO1: Demonstrate the necessity and evolution of PCB, types and classes of PCB.**(K3)**
CO2: Understand the steps involved in Design flow, schematic, layout and Art Making of PCB design.**(K2)**
CO3: Build **(**Sketch schematic and layout and fabricate) PCB for simple circuits. **(K3)**
CO4: Understand basic concepts of transmission line, crosstalk and thermal issues in PCB Design.**(K2)**
CO5: Identify the step involved in the PCB testing.**(K2)**

Module I: Introduction to PCB

Learning outcome:
Students will be able to

1. Demonstrate the background and History of PCB.
2. Identify the classes of PCB.
3. Familiar with Electronic design automation (EDA) tools and compare among themselves.

Content: (7Pds.)
Definition and Need/Relevance of PCB, Background and History of PCB, Types of PCB, Classes of PCB Design, Terminology in PCB Design, Different Electronic design automation (EDA) tools and comparison, PCB Materials.

Module II: PCB Design Process

Learning outcome:
Students will be able to

1. Explain PCB Design Flow.
2. Define Artwork generation Methods - manual and CAD,Photo Printing, Screen Printing.
3. Understand the factors for designing digital and analog circuits PCB.
4. Differentiate Layout and Artwork making for Single-side, double-side and MultilayerBoards.

Content: (10Pds.)

PCB Design Flow, Placement and routing, Steps involved in layout design, Artwork generation Methods - manual and CAD,Photo Printing, Screen Printing, General design factor for digital and analog circuits,Digital circuit PCB, Power circuit PCB.Layout and Artwork making for Single-side, double-side and MultilayerBoards. Design for manufacturability, Design-specification standards.

Module III:Introduction to PCB Fabrication & Assembly

Learning outcome:
Students will be able to

1. Explain the Steps involved in fabrication of PCB.
2. Identify the single, double sided and multilayerPCB Fabrication techniques.
3. Familiar with the step of Post operations of design process.

Content: (7Pds.)

Steps involved in fabrication of PCB. PCB Fabrication techniques-single, double sided and multilayer. Etching: chemical principles and mechanisms. Post operations- stripping, black oxide coating and solder masking. PCB component assembly processes.

Module IV: Transmission lines and crosstalk

Learning outcome:
Students will be able to

1. Identify the role of Transmission linesin Board design.
2. Explain the effect and the method of minimization of crosstalk.
3. Demonstrate the Heat Sink concepts with respect to PCB design.

Content: (7Pds.)

Transmission lines and its effects, Significance of Transmission line in Board design, Typesof Transmission lines.The crosstalk in transmission lines, Crosstalk control in PCB design parts, planes, tracks, connectors,terminations. Minimization of crosstalk.Thermal mapping of design.Application of Heat Sink concepts.

Module V:PCB Testing

Learning outcome:

Students will be able to

1. Define the Basic Principles of PCB Testing.
2. Explain the Concepts of Manual and Automated Trouble Shooting of PCBs.

Content: (7Pds.)
Principles of Fundamental Testing Methods – Basic Principles of PCB Testing – PCB Track Short Testing Methods –Concepts of Trouble Shooting PCBs - Manual and Automated PCB Trouble Shooting Techniques.

References

1. Printed Circuit Board:Design, Fabrication, by RS Khandpur, Tata McGraw Hill Education Pvt Ltd., New Delhi

2. Electronic Product Design Volume-I by S D Mehta, S Chand Publications

3. Open source EDA Tool KiCad Tutorial: http://kicad-pcb.org/help/tutorials/

4. PCB design & Technology",Walter C Bosschard, "McGraw Hill, New Delhi.

5.Electronic Project Design and Fabrication",Ronald A. Reis, "Prentice Hall.

6. PCB Fabrication user guide page: http://www.wikihow.com/Create-Printed-Circuit-Boards http://www.siongboon.com/projects/2005-09-07_home_pcb_fabrication/ , http://reprap.org/wiki/MakePCBInstructions#Making_PCBs_yourself

7. PCB Fabrication at home(video): https://www.youtube.com/watch?v=mv7Y0A9YeUc, https://www.youtube.com/watch?v=imQTCW1yWkg

Electronic Equipment Maintenance

Course Code	ECPE-407/C
Course Title	Electronic Equipment Maintenance
Number of Credits	3(L:3,T:0,P:0)
Prerequisites	NIL
Course Category	PE

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Explain about the basic steps, troubleshooting procedure of Electronic Maintenance Equipment**.(K2)**

C.O.2: Classify and testing procedure of Passive components. **(K4)**

C.O.3: Classify and testing procedure of Active components. **(K4)**

C.O.4: Compare and demonstrate procedure of on board ICs.**(K2)**

C.O.5: Explain about the surface mount assemblies, Technology and semi-conductor packages**.(K2)**

Course

Unit 1:

Learning Outcomes:
Students will be able to:

1.Explain the steps and type of maintenance Electronic Equipments.
2.Explain troubleshooting procedure ,fault analysis and fault finding.
3.List of do and donot for use and maintenance of tools.

Content:
Fundamental Troubleshooting Procedures Inside An Electronic Equipment: Reading Drawings And Diagrams – Block Diagram, Circuit Diagram, Wiring Diagram; Dis-assembly and re-assembly of equipment, Equipment Failures and causes such as poor design, production deficiencies, careless storage and transport, inappropriate operating conditions, Nature of faults, Fault location procedure,Fault finding aids – Service and maintenance manuals and instruction manuals, Test and Measuring instruments, special tools Troubleshooting techniques, Approaching components for tests, Ground-ing systems in Electronic Equipment, Temperature sensitive Intermittent problems Corrective actions, Situations where repairs should not be attempted..

Unit 2 :
Learning Outcomes:
Students will be able to:

1.Describe procedure for testing passive component.

Content:
Passive Components and Their Testing Passive Components- Resistors, Capacitors, Inductors Failures in fixed resistors, testing of resistors, variable resistors, variable resistors as potentiometers, failures in potentiometers, testing of potentiometers, servicing potentiometers, LDRs and Thermistors Types of capacitors and their performance, Failures in capacitors, testing of capacitors and precautions therein, variable capacitor types, Testing of inductors and inductance measurement.

Unit 3 :
Learning Outcomes:
Students will be able to:

1. Describe procedure for testing and diagnosis passive components.

Content:
Testing of Semiconductor Devices Types of semiconductor devices, Causes of failure in Semiconductor Devices, Types of failure Test procedures for Diodes, special types of Diodes, Bipolar Junction Transistors, Field Effect Transistors, Thyristors Operational Amplifiers, Fault
Diagnosis in op-amp. Circuits.

Unit 4:
Learning Outcomes:
Students will be able to:

1.Explain the parameter of different type of ICs.
2.Describe for fault diagnosis in digital circuits.

Content:
Logic IC families, Packages in Digital ICs, IC identification, IC pin-outs, Handling ICs, Digital troubleshooting methods – typical faults, testing digital ICs with pulse generators Logic clip, Logic Probe, Logic Pulser, Logic Current Tracer, Logic Comparator Special consideration for fault diagnosis in digital circuits Handling precautions for ICs sensitive to static electricity Testing flip-flops, counters, registers, multiplexers and de-multiplexers, encoders and decoders; Tri-state logic.

Unit 5:
Learning Outcomes:
Students will be able to:

1.Describe of surface mount assemblies, Technology and semi-conductor packages.

Content:
Rework and Repair of Surface Mount Assemblies Surface Mount Technology and surface mount devices Surface Mount Semiconductor packages – SOIC, SOT, LCCC, LGA, BGA, COB, Flatpacks and Quad Packs, Cylindrical Diode Packages, Packaging of Passive Components as SMDs Repairing Surface Mount PCBs, Rework Stations.

References:
1.Modern Electronic Equipment: Troubleshooting, Repair and Maintenance, Khandpur, TMH 2006.
2. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting, R. G. Gupta, Tata McGraw Hill Edition 2001.
3. Student Reference Manual for Electronic Instrumentation Laboratories, David L Terrell, Butterworth-Heinemann.
4. Electronic Testing and Fault Diagnosis, G. C. Loveday, A. H, Wheeler Publishing.

S. No.	Title of Book	Author	Publication
1.	Modern Electronic Equipment: Trouble shooting, Repair and Maintenance	Khandpur	TMH 2006
2.	Electronic Instruments and Systems: Prin ciples, Maintenance and Troubleshooting	R. G. Gupta	Tata McGraw Hill Edition 2001
3.	Student Reference Manual for Electronic Instrumentation Laboratories	David L Terrell	Butterworth-Heinemann
4.	Electronic Testing and Fault Diagnosis	G. C. Loveday, A. H	Wheeler Publishing

Professional Skill Development

Course Code	:	HS-408
Course Title	:	Professional Skill Development (Theory)
Number of Credits	:	3 (L: 2, T: 1, P:0)
Prerequisites	:	NIL
Course Category	:	HS

Course Outcomes:

After successful completion of this course, students would be able to:

CO1: Understand the importance of soft skills and personality in a person's career growth. K2

CO2: Communicate uprightly while looking for a job. K3

CO3: Learn and utilize the key skills while facing job interview. K2 & K3

CO4: Demonstrate effective writing skills for professional excellence. K2

CO5: Explore ways to make oral communications interesting and captivating. K3

Unit – 1Soft Skills & Personality Development

Number of Class Hours: 06 **Marks: 08**

Learning Outcomes:

1) Get acquainted with the details of soft skills and the importance of personality K1
2) Understand the importance of communication skills in developing one's personality. K2
3) Understand the importance of soft skills and personality in a person's career growth K2

Detailed Content:

1. **Soft skills - Demand of Every Employer:** How soft skills complement hard skills, Soft skills as competitive weapon, Classification of soft skills into personal and interpersonal traits, Soft skills needed for career growth- Time management, Leadership traits, Communication and networking skills, Teamwork and Interpersonal skills, Empathy and Listening skills, Responsibility, Attitude, Ethics, Integrity, Values and Trust.

2. **Personality Development – A must for career Growth:** Grooming one's personality as a signal that others read, mapping different personality types – Perfectionists, Helpers, Achievers, Romantics, Observers, Questioners, Enthusiasts or adventurers, Bosses or asserters, Mediators or peacemakers.

Unit – 2 Looking for a Job

Number of Class Hours: 05 **Marks: 08**

Learning Outcomes:

1) Learn to write Job Applications, Cover Letter, Resume, Curriculum Vitae, bio data K2
2) Develop interpersonal skills/ soft skills through Group Discussion. K3

Detailed Content

1. Job Application : Job Application Letters in response to advertisements, Self-application letters for Jobs
2. Curriculum Vitae/Resume: Formats of Resume and CV for a fresher and for someone with experience, Differences between Resume, CV, Bio-data, and choice of referees.
3. Group Discussion : A test of soft skills

Unit – 3 Job Interviews

Number of Class Hours: 05 Marks: 08

Learning Outcomes:

1) Understand the importance of Job interviews in the selection procedure K2
2) Comprehend and Adapt tovarious types, stages and processes of job interviews K1&K3
3) Demonstrate appropriate body language in interviews K3

Detailed Content

1. Job Interviews: Definition, processes of Interviews, Types of Interviews
2. Stages in Job interviews: Before interview stage, On D' Day, After interview stage.
3. Importance of Body language in Interviews: : Facing an interview, Using proper verbal and non- verbal cues, the perfect handshake ,Exhibiting confidence, the business etiquettes to maintain, body language ,and dress code - what to speak, how to speak in an interview and answer interview questions, negative body language, handling an awkward situation in an interview.
4. Probable interview questions and answers.
5. Mock interviews to be conducted by mock interview boards.

Unit – 4 Enhancing Writing skills

Number of Class Hours: 12 Marks: 08

Learning Outcomes:

1) Write dialogues on given topics / situations K3
2) Express facts &ideas effectively in written form K3
3) Learn to write formal and informal letters&emails. K2

Detailed Content

1) **Art of Condensation**: Principles to increase clarity of written communication.
2) **Dialogue Writing:** Meeting and Parting, Introducing and Influencing, Requests, Agreeing and Disagreeing, Inquiries and Information.
3) **Letter Writing:** Placing an order, Letter to Inquiry, Letter of Complaint, Letter seeking permission.
4) **E- mail writing**: writing the perfect e-mail, steps to the perfect e-mail, formal and informal greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail, informing about a file attached in an email, writing the formal ending of an e-mail.

Unit – 5 Conversations, Panel Discussion and Public Speaking

Number of Class Hours:12 Marks: 08

Learning Outcomes:

1. Speak persuasively on a given topic fluently and clearly. K3
2. Participate in formal and informal conversations. K3
3. Express ideas and views on given topics. K3

Detailed Content

1) **Conversation & Dialogue Practice:**
   a) Introducing oneself
   b) Introduction about family
   c) Discussion about the weather
   d) Seeking Permission to do something
   e) Seeking Information at Railway Station/ Airport
   f) Taking Appointments from superiors and industry personnel
   g) Conversation with the Cashier- College/ bank
   h) Discussing holiday plans
   i) Asking about products in a shopping mall
   j) Talking over the Telephone

2) **Panel Discussion:** Act of a moderator - ways to respond to audience questions.
Suggested topics: Current Affairs

3) **Public Speaking**: Art of Persuasion, Making speeches interesting, Delivering different types of speeches: Ceremonial, Demonstrative, Informative, Persuasive.

List of Software/Learning Websites

1. http://www.free-english-study.com/
2. http://www.english-online.org.uk/course.htm
3. http://www.english-online.org.uk/
4. http://www.talkenglish.com/
5. http://www.learnenglish.de/

Reference Books:
(Name of Authors/ Title of the Book /Edition /Name of the Publisher)

1) Sanjay Kumar &PushpLata Communications Skills , 2nd Edition,Oxford University Press
2) Meenakshi Raman & Sangeeta Sharma Technical Communication: Principles & Practice Oxford University Press
3) M. Raman & S. Sharma Technical Communication Oxford University Press
4) Barun Kumar Mitra, Personality Development and Soft Skills Oxford University Press

Minor Project

Course Code	ECPR-409
Course Title	Minor Project
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	Nil
Course Category	Project Work (PR)

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Demonstrate a through and systematic understanding of project contents (K2).

C.O. 2: Identify the methodologies and professional way of documentation and communication (K3).

C.O. 3: Illustrate the key stages in development of the project (K2).

C.O. 4: Develop the skill of working in a Team (K3).

C.O. 5: Apply the idea of mini project for developing systematic work plan in major project (K3).

Course Content:-

The minor project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The course should have the following-

1) Perform detailed study about various components of a project.
2) Study about methodologies and professional way of documentation and communication related to project work.
3) Develop idea about problem formulation.
4) Knowledge of how to organize, scope, plan, do and act within a project thesis.
5) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
6) Demonstrate the implementation of a minor project work.

Essence of Indian Knowledge and Tradition

Course Code	AU-410
Course Title	Essence of Indian Knowledge and Tradition
Number of Credits	0
Prerequisites	NA
Course Category	Audit

Course Outcomes: -

After completion of the course the students will be able to-

CO 1: Understand the essence of Indian tradition and the importance of carrying them forward. (**K_2**)
CO 2: Understand the Vedic literature and important ideas discussed in the Vedas. (**K_2**)
CO 3: Describe scientific heritage of ancient India along with comprehending its relevance and application in various modern scientific disciplines. (**K_1**)
CO 4: Relate the theoretical and practical sides of the science of Yoga and Aurveda with modern knowledge systems. (**K_1**)
CO 5: Explain the worth of Indian intellectual heritage, traditional practices and Indian lifestyle from scientific lenses. (**K_4**)

Module- 1

Name of the Module: Introduction to Vedic Literature

Number of class hours:**05**

Content:

- General structure of Vedic Literature,
- Different theories on the age of the Vedas,
- Educational system in the Vedic times
- subject-matter of Ṛgveda-samhitā, *Sāmaveda -Saṁhitā, Yajurveda-Saṁhitā, Atharvaveda-Saṁhitā, Brāhmaṇa*and *Āraṇyaka* literature, Upaveda

Learning outcomes of the Module

1	Describe the Vedic literature (K1)
2	Outline the heritage of ancient India specially the scientific knowledge that is embedded in the Vedas will be shown through this module (K2)

Module- 2

Name of the Unit: Fundamental doctrines of the *Upaniṣad*s

Number of class hours:**05**

Content:

- General introduction of Upaniṣadic literature
- Philosophical ideas and ethics in Upaniṣadas

Learning outcomes of the Module

1.	Understand Upaniṣads and its significance as the perennial source Indian philosophy (K2)
2.	Explain the scientific temperament, knowledge and methods of scientific enquiry that is embedded in the Upaniṣadas (K2)

Module- 3

Name of the Unit: *Vedāṅga*s, Purāṇasand Dharmaśāstra Literature

Number of class hours:**05**

Content:

- Introduction to Vedāṅga Literature
- History of Sanskrit Grammar
- An Overview of Purāṇic literature
- History of Dharmaśāstra

Learning outcomes of the Module

1.	Describe various scientific and academic disciplines of ancient India along with scientific knowledge that is rooted in the Puranic literature (K1)
2.	Remember ancient system of Law and Governance in a nutshell especially the principles and philosophy behind the ancient constitutions (K1)

Module- 4

Name of the Module: Introduction to Indian Philosophical Systems, Scientific aspects of Indian knowledge systems

Number of class hours:**05**

Content:

- General introduction to Indian Philosophical systems, i.e. Orthodox and Heterodox
- Glimpse of ancient Indian Science and technology.

Learning outcomes of the Module

1.	Describe the Indian Philosophical systems and their relevance and application in modern scientific enquiry (K1)
2.	Remember the various scientific methods, means and validity of knowledge as discussed in these systems, methods of discussion, debate and systemic learning as structured in ancient Indian knowledge literature (K1)

Module- 5

Name of the Unit: Introduction to Yoga &Āyurveda

Number of class hours:**05**

Content:

- General ideas about Yoga,
- Origin and Development of Pātañjala Yoga,
- Origin and Development of Āyurveda and its relevance

Learning outcomes of the Module

1.	Understand about principles and philosophy of Yogic sciences and Āyurveda. (K2)
2.	Identify various ancient texts, practices of Yoga and Āyurveda along with gaining basic practical and theoretical knowledge which they will be able to relate with modern healthcare systems (K4)

References: -

1) Capra, Fritjof. *The Tao of Phisics*. New York: Harpercollins, 2007.
2) Capra, Fritjof. *The Web of Life*. London: Harpar Collins Publishers, 1996.
3) Dasgupta, Surendranath & De, Sushil Kumar. *A History of Sanskrit Literature.*Delhi: Motilal Banarsidass, 2017.
4) Dasgupta, Surendranath. *A History of Indian Philosophy*. Delhi: Motilal Banarsidass, 1991.
5) Gonda, Jan. *A History of Vedic Literature*. Delhi: Monohar Publishers and Distributors, 2020.
6) Jha, R.N. *Science and Consciousness Psychotherapy and Yoga Practices*. Delhi: VidyanidhiPrakashan, 2016.
7) Kane. P.V. *History of Dharmasastra*, Poona: Bhandarkar Oriental Research Institute, 1930.
8) Max Muller. *Ancient Sanskrit Literature*, London: Spottiswoode and Co., 1859.
9) Pride of India,New Delhi: Samskrita Bharati, 2006.
10) Shastri, Gourinath. *A History of Vedic Literature*, Kolkata: Sanskrit Pustak Bhandar, 2006.

11) Sinha, Jadunath. *Indian Philosophy*. Delhi: Motilal Banarsidass,1938.
12) Wujastiyk, Dominik. *The Roots of Ayurveda*. India: Penguin India, 2000.

SEMESTER V

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-16	ECPC-501	Embedded Systems	3	0	0	3	3
2	Programme core course-17	ECPC-502	Mobile and Wireless Communication	3	0	0	3	3
3	Programme core course-18	ECPC-503	Embedded Systems Lab	0	0	2	2	1
4	Programme core course-19	ECPC-504	Mobile and Wireless Communication Lab	0	0	2	2	1
5	Programme core course-20	ECPC-505	Digital System Design Lab	0	0	2	2	1
6	Programme elective course-2 (Any One to be selected)	ECPE-506/A	Microwave and RADAR	4	0	0	4	4
		ECPE-506/B	Optical Communication and networking					
		ECPE-506/C	Control System and PLC					
7	Programme elective course-3 (Any One to be selected)	ECPE-507/A	Microwave and RADAR Lab	0	0	4	4	2
		ECPE-507/B	Optical Communication and networking Lab					
		ECPE-507/C	Control System and PLC Lab					
8	Open elective course-1	(Any one to be selected from Annexure-I)		3	0	0	3	3
9	Summer Internship-II (6 weeks) after IV Semester	ECSI-509		0	0	0	0	3
10	Major Project	ECPR-510		0	0	2	2	1
			Total					**22**

Embedded Systems

Course Code	ECPC-501
Course Title:	Embedded Systems
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcome:-

On completion of the syllabus, the Students will be able to:-

C.O.1: Illustrate the concept of Embedded systems and RTOS. (K2)

C.O.2:Develop basic embedded c codes for - Boolean and bitwise operations (K3)

C.O.3: Demonstrate embedded c codes for branching and looping operations (K2)

C.O.4: Understand the function of Arduino Mega pins and ports. (K2)

C.O.5: Summarize the real-life applications of the Arduino Mega communication modules (K2)

Course Content:

Module I- Introduction to Embedded systems

No. of Lectures: 6

Suggested Learning Outcomes:

1. Illustrate the concept of Embedded systems.
2. Classify the types of Embedded System.
3. Outline the characteristics of Embedded system
4. Understand the concept of Real time systems and its types.
5. Compare between RTOS and General purpose OS

Content

Introduction to embedded systems. Features of embedded systems. Characteristics of Embedded Systems. Classification of embedded systems. Examples of embedded systems. Architecture of embedded system.Real time systems, examples of real time systems. Types of real time systems.Introduction to RTOS, difference between RTOS and General purpose

OS. Need for RTOS in embedded systems. kernel and its functions.

Module II - Embedded C basics operators for Arduino

No. of lectures:6

Suggested Learning Outcomes: The students on completion of Module II shall be able to:

1. Illustrate the Arduino IDE
2. Explain the serial port communication
3. Develop embedded c codes for Boolean operation
4. Develop embedded c codes for pointer access operation
5. Demonstrate embedded c codes for bitwise operation

Content

Familiarizing with the Arduino IDE.Sketch designing for Arduino. Communication interface using serial port. Basicunderstanding of the code with boolean operations, pointer access operations, bitwiseoperations, compounded operations.

Module III - Embedded C control structure blocks

No. of lectures: 6

Suggested Learning Outcomes: The students on completion of Module III shall be able to:

1. Develop codes for for loop
2. Experiment with codes for while loop
3. Experiment with codes for do-while loop
4. Develop codes for conditional branching operations

Content

Looping mechanism – for, do and whileloops.The branching operations based on conditions expression

Module IV- Introduction to Arduino Mega

No. of lectures: 6

Suggested Learning Outcomes: The students on completion of Module IV shall be able to:

1. Outline the Arduino Mega specifications.
2. Summarize the Arduino Mega pins and ports
3. Summarize the digital and analog peripherals
4. Compare between embedded C and C programming language

Content

Arduino Mega specifications including power ratings, digital and analog peripherals.

Difference between the C language and Embedded C language

Arduino Mega Ports, Pins, Digital and Analog Peripherals

ModuleV- Communication with Arduino

No. of lectures: 6

Suggested Learning Outcomes: The students on completion of Module V shall be able to:

1. Classify the different communication modules of Arduino Mega.
2. Summarize the real-life applications of the communication modules of Arduino Mega.
3. Outline the various communication interfaces.

Content

Different communication modules available with their real-life application,Communication interface.

SUGGESTED LEARNING RESOURCES:

1. Arduino Projects For Dummies (For Dummies Series),KennedyGeorge;Davis Bernard;

Prasanna SRM,Wiley (5 July 2013).ISBN : 978-1118551479

2. Make: Getting Started WithArduino - The Open SourceElectronics PrototypingPlatform

Massimo Banziand Michael ShilohShroff/Maker Media; Third edition (27December 2014)

ISBN : 978-9351109075

3. Real Time Operating System-Rajib Mall

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. https://www.arduino.cc/reference/en/

2. https://learn.adafruit.com/category/learn-arduino

Mobile and Wireless Communication

Course Code	ECPC-502
Course Title:	Mobile and Wireless Communication
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcomes: After completing the course, the students will be able to

C.O.1: Explain cellular system, 2G/3G/4G/5G mobile network, Frequency reuses and channel interferences (K2).

C.O.2: Demonstrate concepts related to wireless propagation (K2).

C.O.3: Explain concepts of wireless antenna (K2).

C.O.4: Explain different multiplexing techniques (K2).

C.O.5: Illustrate the concepts and applications of Bluetooth, RFID, WLAN and WiMAX (K2).

Course Contents:

Module 1: Overview of Cellular Systems. **No. of lectures:** 8

Learning Outcomes: Students will be able to explain

5. Basics of data cellular systems.
6. Evolution of 2g/3G/4G/5G mobile network concept.
7. Frequency reuses and channel interferences.

Overview of Cellular Systems, Evolution 2g/3G/4G/5G Cellular Concepts – Frequency reuse, Co channel and Adjacent channel Interference

Module 2: Wireless propagation **No. of lectures**: 8

Learning Outcomes: Students will be able to explain

4. Wireless propagation, budget, loss, noise, fading and shadowing.

Wireless propagation Link budget, Free-space path loss, Noise figure of receiver Multipath fading, Shadowing, Fading margin, shadowing margin.

Module 3: Wireless Antenna **No. of lectures**: 8

Learning Outcomes: Students will be able to explain

4. Types of wireless antenna.
5. Wireless channel, capacity and MIMO technology for wireless antenna.

Antenna diversity, wireless channel capacity and MIMO.

Module 4: Overview of multiplexing techniques. **No. of lectures:** 6

Learning Outcomes: Students will be able to explain

3. Multiplexing and different multiplexing techniques.
4. LTE technology.

Overview of CDMA, OFDM and LTE.

Module 5: Wireless Networking Technologies. **No. of lectures:** 6

Learning Outcomes: Students will be able to explain

1. Classification of Bluetooth technologies.
2. Concepts and applications of RFID
3. Demonstrate WLAN and WiMAX technologies.

Overview of Bluetooth technologies, RFID, WLAN and WiMAX.

References:

S. No.	Title of Book	Author	Publication
1	Wireless Communications – Principles and Practice	T. S. Rappaport	(2nd edition) Pearson ISBN 9788131731864
2	Modern Wireless Communications	Haykin& Moher	Pearson 2011 (Indian Edition) ISBN : 978-8131704431

Embedded Systems Lab

Course Code	ECPC-503
Course Title:	Embedded Systems Lab
Number of credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	PC

Course Outcome:-

On completion of the experiments, the Students will be able to:-

C.O.1: Experiment with codes for LED blinking. (K3)

C.O.2: Develop user interface through serial ports. (K3)

C.O.3: Make use of looping mechanism to control LEDs and check status of a given pin. (K3)

C.O.4: Demonstrate the control servo motor using PWM pin. (K2)

C.O.5: Model a temperature sensor interfacing and I2C light sensor interfacing circuit using Arduino (K3)

List of experiments (To perform minimum 6 practical).

1. Built-in LED state control by push button sketch implementation.

2. Built-in LED blinking sketch implementation.

3. Built-in LED blinking by toggling states based on binary operation.

4. Built-in LED state control by user interface through serial port.

5. User interface for boolean operation and bit wise operation through serial port.

6. User interface for compounded operation through serial port.

7. Looping mechanism to check the state of pin and if change print its status on serial port.

8. Controlling multiple LEDs with a loop and an array.

9. Use a potentiometer to control the blinking of an LED.

10. Use an analog output (PWM pin) to fade an LED.

11. Servo Motor Control using PWM.

12. Temperature sensor interfacing and sending its reading over serial port.

13. I2C light sensor interfacing and sending its reading over serial port.

Suggested learning resources:

1. Arduino Projects For Dummies (For Dummies Series) Kennedy George; Davis Bernard; Prasanna SRM Wiley (5 July 2013) ISBN : 978-1118551479

2. Make: Getting Started With Arduino - The Open Source Electronics Prototyping Platform Massimo Banzi and Michael Shiloh Shroff/Maker Media; Third edition (27 December 2014) ISBN : 9789351109075

Suggested software/learning websites:

1. https://www.arduino.cc/reference/en/

2. https://learn.adafruit.com/category/learn-arduino

Suggested list of Hardware and software

Arduino Mega Development Boards or equivalent

Arduino IDE or equivalent

Mobile and Wireless Communication Lab

Course Code	ECPC-504
Course Title:	Mobile and Wireless Communication Lab
Number of credits	1 (L: 0, T: 0, P: 2)
Prerequisites	NIL
Course Category	PC

Course Outcomes: Students will be able to

C.O.1: Model the cellular frequency reuse concept. (K3).

C.O.2: Solve the path loss and path loss with shadow problems (K3).
C.O.3: Experiment with flat fading and frequency selective fading (K3).

C.O.4: Experiment with multipath channel fading (K3).

C.O.5: Modelling of dipole antenna for given wavelength using 4NEC2 (K3).

C.O.6: Experiment with CDMA trainer kit (K3)

Course Contents (Minimum Six experiments to be performed):

1. To understand the cellular frequency reuse concept to Finding the co-channel cells for a particular cell.
2. To understand the path loss prediction formula.
3. Understand the path loss with shadowing.
4. Understanding the Flat fading
5. Understanding the Frequency selective fading

6. Understanding the Multipath channel for the following objectives
    a) No Fading
    b) Flat Fading
    c) Dispersive Fading
7. To simulate a dipole antenna (λ, λ/4, λ/2, 3λ/2) for a particular frequency using 4NEC2
8. Perform following experiments using CDMA trainer kit
    a) PSK modulation and demodulation experiment
    b) Bit synchronization extraction experiment
    c) Error correction encoding experiment

Equipment and software Requirements:

7. Virtual lab
8. 4NEC2 software
9. CDMA trainer Kit

References:

S. No.	Title of Book	Author	Publication
1	Wireless Communications – Principles and Practice	T. S. Rappaport,	(2nd edition) Pearson ISBN 9788131731864
2	Modern Wireless Communications	Haykin& Moher	Pearson 2011 (Indian Edition) ISBN : 978-8131704431

Digital System Design Lab

Course Code	ECPC-505
Course Title	Digital System Design Lab
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Digital Electronics
Course Category	PC

Course Outcome:-

Students will be able to:-

C.O.1: Demonstrate the implementation of logic gates in hardware description language (K2)

C.O.2: Develop HDL program for arithmetic digital circuits (K3)

C.O.3: Experiment with data processing circuits on hardware platforms (K3)

C.O.4: Experiment with sequential circuits using hardware description language on implementation on reconfigurable platforms (K3)

List of Experiments*(To perform minimum 6 practical).*

Design, Simulation and Implementation of following circuits using any Hardware Description Language on FPGA or equivalent hardware platform.

1. Logic gates – AND, OR, NOT, NAND, NOR, XOR, XNOR
2. Half Adder,Full Adder
3. 4-bit Adder/Subtractor
4. Multiplexer, De-multiplexer
5. Encoders, Decoders
6. Code converters, Magnitude Comparators
7. Flip-flops, Registers
8. Counters,State machine design

List of equipment and software:

1) Xilinx Vivado software
2) Intel Quartus software
3) Modelsim Software
4) FPGA development boards with minimum 16 input switches and 16 output LEDs.

MICROWAVE AND RADAR

Course Code	ECPE-506/A
Course Title	Microwave and Radar
Number of Credits	4 (L: 4, T: 0, P: 0)
Prerequisites	NIL
Course Category	PE

Course Outcomes:

After Completion of the course students would be able to

CO1: Illustrate various modes of microwave transmission.(K2)

CO2: Apply their knowledge to analysewaveguide and transmission line w.r.t. wave propagation. (K3)

CO3: Explain the operation of various microwave devices. (K2)

CO4: Describe various parameter measurement methods at microwave frequency range. (K2)

CO5: Demonstrate the basic operation of radar system. (K2)

Unit-IIntroduction to Microwaves

Total class hours- 6

Learning Outcomes

After Completion of Unit-1 students would be able to

1. Define various modes of microwave transmission.
2. Know various applications of microwave engineering.

History and applications of microwave, Microwave transmission modes, Frequency bands, Impedance matching, Effect of microwaves on human body

Unit-II Waveguide and Transmission line

Total class hours- 6

Learning Outcomes

After Completion of Unit-II students would be able to

1. Apply their knowledge to analyzewaveguide and transmission line w.r.t wave propagation.
2. Distinguish between waveguide and transmission line.

Parallel plane and rectangular waveguides, cut off mode, cut off frequency, simple numericals

Transmission line equations and solutions, reflection and transmission coefficients, standing wave ratio, simple numerical, Introduction to micro strip line

Unit-IIIPassive and Active Microwave Devices

Total class hours- 6

Learning Outcomes

After Completion of Unit-III students would be able to

1. Explain the operation of various microwave devices.
2. Illustrate the applications of various microwave devices.

Directional Coupler, Power Divider, Attenuator, Resonator, Bends, Twists, Circulator, Isolator, Gun diode, PIN diode, IMPATT diode,multi cavity klystron, reflex klystron, TWT

Unit-IV Microwave Measurements

Total class hours- 6

Learning Outcomes

After Completion of Unit-IV students would be able to

1. Describe various parameter measurement methods at microwave frequency range.
2. Understand the applications of network analyzer and spectrum analyzer.

Measurement of power, frequency and impedance at microwave range, network analyzer for measurement of scattering parameters, spectrum analyzer for measurement of spectrum

Unit-V Radar

Total class hours- 6

Learning Outcomes

After Completion of Unit-V students would be able to

1. Demonstrate the basic operation of radar system.
2. Explain the operation of MTI radar.

Introduction, radar frequencies, operation, equation, CW radar, MTI radar, doppler effect, blind speed, noise figure, noise temperature, displays, simple numericals

References:

S. No.	Title of Book	Author	Publication
1	Microwave Engineering	D.M. Pozar	Wiley (2013)
2	Foundation for Microwave Engi- neering	R.E. Collins	Wiley (2007)
3	Radar Principals, Technology, Applications	Byron Edde	Pearson Education (2004)
4	Introduction to Radar Systems	Merrill I. Skolnik	Tata McGraw-Hill (2001)

Optical Communication and Networking

Course Code	ECPE-506/B
Course Title	Optical Communication and Networking
Number of Credits	4 (L: 4, T: 0, P: 0)
Prerequisites	NIL
Course Category	PE

Course Outcome: -

After completion of the course, students will be able to:

CO1: Identify and classify structures of Optical fibers. (K2)

CO2: Illustrate channel impairments like losses and dispersion. (K2)

CO3: Imply photo Diode and Laser to implement optical transmitter and Receiver. (K3)

CO4: Get a basic understanding of optical components. (K2)

CO5: Apply the concept of routing protocols to implement fiber optical networks. (K3)

CO6: Implement signalling protocols to design long distance optical communication link for high speed optical network (K3)

Course Content:

Unit 1 – Introduction to optical fibers

No of class hours: 7 to 8 hours

Learning Outcomes: -

Students will be able to

1. Be familiar with the operating principles of fiber optics and its characteristics.
2. Classify fibre optics cable types and their operations.
3. Understand losses and dispersion in optical Network.
4. Describe impact of nonlinearities effect in Optical fiber Communication.

Content: -

Introduction, Multimode Fibers, Single Mode Fibers, Signal Degradation, Dispersion, Fiber Nonlinearities,Importance of Nonlinear Effects, Self-Phase Modulation, Cross Phase Modulation, Four waves mixing.

Unit 2 – Optical Transmitters, Receivers and Amplifire

No of class hours: 6 to 7 hours

Learning Outcomes: -

Students will be able to

1. Demonstrate constriction and operations of photo source and detector.
2. Explain design and operation of optical transmitter and receiver.
3. Illustrate the operation of various types of Optical Amplifiers.

Content: -

Light-Emitting Diodes Structures,

Semiconductor Lasers, Distributed Feedback Lasers, TunableSemiconductor Laser, Transmitter Design.

PIN Photodiode, Avalanche Photodiode, Receiver Design ,

Noise Mechanisms , PIN Receivers, APD Receivers , Receiver Sensitivity , Bit-Error Rate.

Basic Concepts, Semi-conductor Optical Amplifiers, Raman Amplifiers , Erbium-Doped Fiber Amplifiers.

Unit 3 – WDM Network Elements andOptical Access Networks

No of class hours: 5 to 6 hours

Learning Outcomes: -

Students will be able to

1. Demonstrate key components of optical networks .
2. Explain architecture and operation of Optical Add/Drop Multiplexers.
3. Understand the concept and operations of WDM and its elements.
4. Analyse traffic grooming and web length assessment in SONET and WDM rings

Content: -

Optical Line Terminals, Optical Line Amplifiers, Optical Add/Drop Multiplexers, OADM Architectures, Reconfigurable OADMs, Optical Cross connects.
Introduction, Overview of PON Technologies, WDM-PON,
Traffic Grooming in SONET Ring,
Traffic Grooming in WDM Ring Networks,

Unit 4 – Routing and Wavelength Conversion:

No of class hours: 6 to 7 hours

Learning Outcomes: -

Students will be able to

1. Explain routing concept of Optical Fiber Network.
2. Demonstrate the process of Wavelength Conversion, Wavelength Converters.
3. Understand protection mechanism in SONET / SDH.
4. Explain the operation of Multicast-Capable Switch Architectures.

Content: -

Introduction, Fixed Routing, Fixed-Alternate Routing, Adaptive Routing, Fault-Tolerant Routing,

Basics of Wavelength Conversion, Wavelength Converters.

Basic Concepts, Protection in SONET / SDH,

Multicast-Capable Switch Architectures.

Unit 5 – Optical Packet Switching (OPS) & Optical Burst Switching (OBS)

No of class hours: 6 to 7 hours

Learning Outcomes: -

Students will be able to

1. Understand operation of Optical Packet Switching (OPS) mechanism.
2. Explain performance and operation of Optical Burst Switching (OBS).
3. Analyse contention resolution and burst grooming strategies in optical burst-switched networks.

Content: -

Introduction, Optical Packet Switching (OPS) Basics,

Node Architecture, Resolution in OPS Networks, Priority-based Routing ,

Edge and Core Nodes in OBS ,BurstAssembly and Scheduling,

Signaling Protocols for OBS, Routing Protocols for OBS,

Contention Resolution in OBS Networks, New Challenges in OBS.

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Optical fiber communications, Principles and Practice	Senior J	PHI ISBN: 978-8131732663
2.	Optical Networks: A Practical Perspective	Rajiv Ramaswami Kumar N. Sivarajan	Elsevier ISBN: 978-9380501376
3.	Optical WDM Networks	Biswanath Mukherjee	springer ISBN: 978-1489978837
4.	Optical fiber communications	Keiser G	McGraw-Hill ISBN: 978-0073380711
5.	Fiber Optic Communication systems	Govind P. Agrawal A John Wiley & Sons	Inc.,Publication. ISBN: 978-8126513864

SUGGESTED SOFTWARE/LEARNING WEBSITES:

https://nptel.ac.in/courses/117/104/117104127/

http://computer.howstuffworks.com/fiber-optic.htm

http://www.ntu.edu.sg/library/Pages/default.aspx

http://fiberu.org/basic/LP3.html

Control Systems and PLC

Course Code	ECPE-506/C
Course Title	Control Systems and PLC
Number of Credits	4 (L:4,T:0,P:0)
Prerequisites	NIL
Course Category	PE

Course Outcome:-

After completion of the course, students will be able to:

1. Identify the types of control systems.**(K3)**
2.Examine the stability of the control system using Routh's stability criteria.**(K4)**
3.Explain working principle of proportional, integral and derivative controllers**(K2)**
4.Identify the components of PLC based process control system.**(K3)**
5.Interpret PLC based process control systems.**(K2)**

Unit-I :Basics of control System:
Learning Outcomes:

Students will be able to:

1.Explain with sketches the working of the given type of control systems.

2.Compare the given control systems based on the given parameters.

3.Derive transfer function of the given electrical circuits.
4.Use block diagram reduction rules to determine optimize transfer function of the given system.

Content:

1.1 Control system: Basics of control system block diagram and practical examples 1.2 Classification of control systems: Open loop and closed loop systems- block diagram, practical example and comparison, Linear and non -linear systems, Time varying and Time In-varying systems- practical example and comparison servo system 1.3 Transfer function: Close loop and openloop system RC. LC and RLC circuits-Differential equations and transfer functions and analysis using Laplace transform 1.4 Block diagram reduction technique: Need, reduction rules.

Unit-II :Time domain stability analysis:
Learning Outcomes:

Students will be able to:

Comparetheparameter of given standard test inputs**.**

1. Identify poles,zeros. type and order for the given transfer function.

2.Sketch pole zero plot for the given transfer function.

3.Determine output of the given order system for the step input.
4.Calculate time response specifications of the given transfer function.

5.Calculate error constant of the given type of control system.

6.Determine stability of the given control system using Routh's stability criteria.

Content:

2.1 Time Response: Transient and steady state response. 2.2 Standard test inputs: Step, ramp, parabolic, impulse and their corresponding Laplace transform 2.3 Analysis of first and second order control system: (i) Poles and zeros - S-plane represent Order of system (0, 1, 2)- standard equation examples and numerical problem (ii) First order system-Analysis for the unit step input, concept of time constant (iii) Second order system- Analysis for unit step input (no derivation), concept, definition and effect of damping (iv) Time response specifications (no derivations)-Tp, Ts, Tr, Td, Mp, Ess, numerical problems 2.4 Steady state analysis: Type 0, 1, 2 systems- Steady state error and error constants numerical problems 2.5 Stability: Concept of stability, root locations in S-plane and analysis- stable system, unstable system, critically stable systems,conditionally stable system, relative stability 2.6 Routh's stability criterion: Steps and procedures to find stability by Routh's stability criteria.

Unit-III :Process controllers:
Learning Outcomes:

Students will be able to:

1.Explain with sketch the given process control system.

2. Describe with sketch the given control action
3.Compare different , electronic controllerson the basis of the given parameters.
4. Sketch the response of the given controller with respect toerror.
Content:

3.1 Process Control System: Block diagram, functions of each block 3.2 Control actions: (i)Discontinuous mode- ON-OFF controllers- equation, neutral zone (ii) Continuous modes: Proportlonal Controller - offset, proportional band.Proportional, Integral and Derivative

controllers -o/p equation, response ,characteristics. 3.3 Composite controllers: PI,PD,PID controllers-

o/p equation, response.

Unit-IV :Fundamentals of PLC:
Learning Outcomes:

Students will be able to:

1.Explain with sketch the PLC based automation system

2.Describe with sketch the given PLC module

3.Identify different device interfaced with PLC
4.Explain the steps for PLC installation
Content:

4.1 PLC-Block diagram, classification, (fixed and modular PLCs), need and benefits of PLC in automation 4.2 Description of different parts of PLC: CPU function, scanning cycle, speed of execution,Power supply- block diagram and function of each block Memory — function and organization of ROM and RAM .Input and output modules- function, different input and output devices of PLC (only name and their uses).4.3 PLCInstallation.

Unit-V :PLC hardware and programming:
Learning Outcomes:

Students will be able to:

1. Identify and describe the given module of PLC.
2. Describe the given addressing of PLC.

3.Use instructionsettoperform thegiven operation.
4.Developladderlogic programs for thegiven application.

Content:

5.1 Discrete input modules: Block diagram, specifications of AC input modules and DC input module. Sinking and sourcing concept in DC input modules 5.2 Discrete output modules: Block diagram description, specifications of AC module and DC output modules 5.3 Analog **input** and output module: Block diagram,specifications.5.4 I/O addressing of PLC: Addressing data files, format of logical address, different addressing types 5.5 PLC Instruction set: Relay instructions, tinier and counter instructions, data movement instructions, logical and comparison instructions .5.6 PLC Programs using Ladder programming language.

Microwave and RADAR Lab.

Course Code	ECPE-507/A
Course Title	Microwave and RADAR Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	NIL
Course Category	PE

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

1. Explainvarious concepts of waveguide. (K2)

2. Identify the unknown impedance using Smith chart. (K3)

3. Analyze the loss and attenuation of attenuator. (K4)

4. Demonstrate the characteristics of cavity resonator. (K2)

5. Analyse the characteristics of Gunn oscillator. (K4)

Sl No	Name of the Experiment (Minimum Six experiments to be performed)
1	To study wave guide components.
2	Todeterminethefrequencyandwavelengthinarectangularwave- guide working in TE10mode.
3	Introduction to Smith chart and its application for the unknown impedance measurement.
4	Study the behaviour of impedance matching for passive networks using Smith chart.
5	To study loss and attenuation measurement of attenuator.

6	Construct a cavity resonator in waveguide and study its characteristics using the network analyzer and a frequency counter.
7	To study the characteristics of Gunn oscillator as modulated source.

Suggested list of resources:

1. Smith chart,
2. HP8350 X-band sweep generator,
3. HP8757 Scalar Network Analyzer,
4. Two waveguide directional couplers,
5. Short section of waveguide,
6. Waveguide iris plate,
7. Waveguide adjustable short,
8. Blank flange,
9. Waveguide isolator,
10. Three waveguide-to-coax adapters,
11. Slide-screw tuner.

References:

Sl No	Title of Book	Author	Publication
1	Microwave Engineering	D.M. Pozar	Wiley; Fourth edition (2013) ISBN 978-8126541904
2	Foundation for Microwave Engineering	R.E. Collins	Wiley; Second edition (2007) ISBN : 978-8126515288

Optical Communication and Networking Lab

Course Code	ECPE-506/B
Course Title	Optical Communication and Networking Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	NIL
Course Category	PE

PRACTICALS/ EXERCISES (Minimum six experiments to be performed):

S. No.	List of Experiments
1.	Measure Numerical Aperture of optical fiber.
2	Measure attenuation of given optical fiber
3	Measure bending loss of given optical fiber.
4	Demonstrate various fibercables .
5	Demonstrate fiber end preparation process.
6	Plot characteristics of LASER diode.
7	Plot characteristics of Photo Diode..
8	Long haul Optical WDM network designs.
9	Demonstrate Splicing Techniques.
10	Demonstrate Optical Power Meter.
11	Study of Optical Packet Switching (OPS) & Optical Burst Switching (OBS)
	Total

Reference Books:

S. No.	Title of Books	Author	Publication
1	Optical Fiber Communication	John M Senior	Pearson
2	Fiber Optics & Optoelectronics	R P Khare	Oxford
3	Fiber Optic Communication	D C Agarwal	S Chands
4	Light wave Communication Systems: A Practical Perspectives	Rajappa Papannareddy	Penram
5	Optical Fiber&Fiber Optic Communication	Subir Kumar Sarkar	S Chands

CONTROL SYSTEMS AND PLC LAB

Course Code	:	ECPC-507/C
Course Title	:	Control Systems and PLC Lab
Number of Credits	:	2 (L: 0, T:0 P: 4)
Prerequisites	:	NIL
Course Category	:	PE

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Analyzetheerrors in control systems.(K4)

C.O.2: Examine the responses of step input in RC and RLC circuits.(K4)

C.O.3: Compare the performance of PI, PD, PIDcontrollers (K4).

C.O.4: Develop ladder diagram for digital logic circuits and implement onPLC (K3)

C.O.5: Model temperature controller, traffic light control system and stepper motor control system using ladder diagram and implement on PLC (K3)

Course Content (Perform at least six experiments from the following):

1.Use potentiometer as error detector.

2.Determine error of angular position of DC servo system.

3.Test the Step response of R-C (first order) circuit.

4.Test the functionality of temperature control with on-off controller.

5.Test the Step response of R-L-C (second order) circuit.

6.Use PI controller to control temperature of the given process.

7.Use PID controller to control temperature of the given process.

8.Use PD controller to control temperature of the given process.

9.Ideitify and test different parts of PLC.

10.Develop ladder diagram to test the functionality of the logic gates.

11.Develop ladder diagram to test Demorgan's theorem.

12.Develop the ladder diagram for Adder and Subtractor by using PLC.

13.Develop ladder Develop the ladder diagram for Adder and Subtractor by using PLC

14.Develop ladder diagram for temperature controller

15Develop ladder diagram for traffic light Control system

16.Develop ladder diagram for stepped motor control.

References:

1.Process control instrumentation Technology, Johnson, C. D. Prentice Hall, 8th edition, United States of America,20l4,ISBN: 978-0131194571

2.Intro. To Programmable logic control, Denning, Gary, Cenage Learning, United States of America,2005
ISBN: 9781401884260
3.Control System Engineering, Nagrath, J.J. ; Gopal, M. , Anshan Publishers (2008) ISBN: 9781848290037
4.Modern control Engineering, Ogala, K., PHI , 5th Edition, NEW DELHI,2010,ISBN:978812034010
5.Programmable logic controllers and industrial automation an introduction, Mitia, Madhuclihanda ; Gupta, Sairarjit Sen, Penram.1st Edition. Mumbai. 2007 ISBN: 9788187972174
6. Programmable logic controllers, J°etrBze1la, F.D., Tata- McGraw Hill, 3"Edition. 2010 ISBN: 9780071067386

Summer Internship-II

Course Code	ECSI-509
Course Title	Summer Internship-II
Number of Credits	3 (L: 0, T: 0, P: 0)
Prerequisites	Fundamental and basic practical skills of relevant discipline/programme
Course Category	Internship

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time during the academic session.

Sl. no.	Schedule	Duration	Activities	Credits	Hours of Work
1	Summer Vacation after 4th Semester	6 Weeks	Industrial/Govt./NGO/MSME/ Rural Internship/Innovation / Entrepreneurship ##	3	120 Hours

(##During the summer vacation after 4th Semester, students are ready for industrial experience. Therefore, they may choose to undergo Internship /Innovation /Entrepreneurship related activities. Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry. In case a student want to pursue his/her family business and don't want to undergo internship, a declaration by a parent may be submitted directly to the TPO.)

Course Outcome: -

After completion of the course, students will be able to:

C.O.1: **Describe a better understanding of the engineering / technological workplace**(K2).

C.O.2: **Develop and demonstrate workplace competencies necessary for professional and academic success (K2).**

C.O.3: **Classify career preferences and professional goals (K3).**

C.O.4: Develop preliminary portfolio including work samples from the internship (K2).

C.O.5: **Increase competitiveness for full-time engineering employment / start-up** (K3).

Course Content:-

Internships are educational and career development opportunities, providing practical experience in a field or discipline. The Summer Internship-II is a student centric activity that would expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry. They are structured, short-term, supervised placements often focused around particular tasks or projects with defined timescales. An internship may be compensated, non-compensated or some time may be paid. The internship has to be meaningful and mutually beneficial to the intern and the organization. It is important that the objectives and the activities of the internship program are clearly defined and understood. Following are the intended objectives of internship training:

1. Will expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Exposure to the current technological developments relevant to the subject area of training.
4. Experience gained from the 'Industrial Internship' in classroom will be used in classroom discussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Learn to apply the Technical knowledge in real industrial situations.
7. Gain experience in writing Technical reports/projects.
8. Expose students to the engineer's responsibilities and ethics.
9. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
10. Promote academic, professional and/or personal development.
11. Expose the students to future employers.
12. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations
13. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Overall compilation of Internship Activities / Credit Framework:

Major Head of Activity	Credit	Schedule	Total Duration	Sub Activity Head	Proposed Document as Evidence	Evaluated by	Performance appraisal/ Maximum points/ activity
Innovation / IPR / Entrepreneurship	3	Summer Vacation after 4th Semester	6 Weeks	Participation in innovation related completions for eg. Hackathons etc.	Certificate	Faculty Mentor	Satisfactory/ Good/ Excellent
				Development of new product/ Business Plan/ registration of start-up	Certificate	Programme Head	Satisfactory/ Good/ Excellent
				Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/ Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.	Certificate	President/ Convener of ICC	Satisfactory/ Good/ Excellent
				Work experience at family business	Declaration by Parent	TPO	Satisfactory/ Good/ Excellent
Internship	3	Summer Vacation after 4th Semester	6 Weeks	(Internship with Industry/ Govt. / NGO/ PSU/ Any Micro/ Small/ Medium enterprise/ Online Internship	Evaluating Report	Faculty Mentor/ TPO/ Industry supervisor	Satisfactory/ Good/ Excellent
Rural Internship	3	Summer Vacation after 4th Semester	6 Weeks	Long Term goals under rural Internship	Evaluating Report	Faculty Mentor/ TPO/ NSS/ NCC head	Satisfactory/ Good/ Excellent

STUDENT'S DIARY/ DAILY LOG

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed at the end of each day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor visiting the industry from time to time and get ratified on the day of his visit.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

a) Regularity in maintenance of the diary.
b) Adequacy & quality of information recorded.
c) Drawings, sketches and data recorded.
d) Thought process and recording techniques used.
e) Organization of the information.

INTERNSHIP REPORT

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact Industrial Supervisor/ Faculty Mentor/TPO for assigning special topics and problems and should prepare the final report on the assigned topics. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The training report should be signed by the Internship Supervisor, TPO and Faculty Mentor. The Internship report will be evaluated on the basis of following criteria:

a) Originality.
b) Adequacy and purposeful write-up.
c) Organization, format, drawings, sketches, style, language etc.
d) Variety and relevance of learning experience.
e) Practical applications, relationships with basic theory and concepts taught in the course.

Major Project - I

Course Code	CEPR-510
Course Title	Minor Project
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Nil
Course Category	Project Work (PR)

Course Outcome:-

After completion of the course, students will be able to:

C.O. 1: Demonstrate a sound technical knowledge of their selected project topic and the knowledge, skills and attitudes of a professional engineer (K2).

C.O. 2: Develop the skill of working in a Team (K3).

C.O. 3: Design engineering solutions to complex problems utilising a systems approach (K6).

C.O. 4: Design the solution of an engineering project involving latest tools and techniques (K6).

C.O. 5: Develop the skill of effective communication with engineers and the community at large in written an oral forms. (K3)

Course Content:-

The major project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The course should have the following-

1) Develop sound knowledge about the domain of the project work.
2) Perform detailed study about various components of a project.
3) Learn to be an important member of a team for successful execution of a project work.
4) Study about methodologies and professional way of documentation and communication related to project work.
5) Develop idea about problem formulation, finding the solution of a complex engineering problem.
6) Develop project report as per the suggested format to communicate the findings of the project work.
7) Acquire the skill of effective oral communication to the fellow engineers and people in the society at large.
8) Knowledge of how to organize, scope, plan, do and act within a project thesis.
9) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
10) Demonstrate the implementation of a major project work.

SEMESTER VI

Sl. No.	Category	Code No.	Course Title	Hours per week			Total Contact Hrs/Week	Credit
				L	T	P		
1	Programme core course-21	ECPC-601	Computer Networking and Data Communication	3	0	0	3	3
2	Programme core course-22	ECPC-602	Electronics Simulation Lab	0	0	4	4	2
3	Programme elective course-4 (Any one to be selected)	ECPE-603/A	Medical Electronics	3	0	3	3	3
		ECPE-603/B	VLSI					
		ECPE-603/C	Signal & System					
4	Humanities and Social Science course-5	HS604	Entrepreneurship and Start-up's	3	1	0	4	4
5	Open elective-2	(Any one to be selected from Annexure-II)		4	0	0	4	4
6	Mandatory Course-2	AU-606	Indian Constitution	2	0	0	2	0
7	Major Project	ECPR-607		0	0	6	6	3
8	Seminar	ECSE-608		2	0	0	2	1
			Total					**20**

Computer Networking and Data Communication

Course Code	ECPC-601
Course Title:	Computer Networking and Data Communication
Number of credits	3 (L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PC

Course Outcomes: After completing the course, the students will be able to

C.O.1: Explain principles of data communication (K2).

C.O.2: Identifyanalog and digital signals and its conversions (K3).

C.O.3: Explainbasics of wireless communication (K2).

C.O.4: Develop space time coding for wireless communication (K3).

C.O.5: Explain different Data Link Layer Technologies (K2).

C.O.6: Explain different Transmission Media &principles of Transmission Control protocol (K2).

Course Contents:

Module 1: Introduction to data communication. **No. of lectures:**6

Learning Outcomes: Students will be able to explain

8. Basics of data communication procedure.
9. Types of computer networks.
10. Computer network topologies, model, transmission media, wired and wireless connectivity.

Concept of analog and digital signals. Bandwidth. Network architecture. Basics of OSI and TCP/IP reference models. Types of Computer Networks – Personal Area Network, Local Area Network, Metropolitan Area Network, Wide Area Network, Internetwork. Computer Network Topologies – Point to Point, Bus topology, Star topology, ring topology, mesh topology, tree topology, Daisy Chain, Hybrid Topology, Computer Network Model. Transmission media. Wired and wireless connectivity.

Module 2: Digital & Analog Transmission **No. of lectures**: 6

Learning Outcomes: Students will be able to identify and explain

5. Digital vs analog transmission and conversion between analog vs digital signals..
6. Various coding methods.

Digital & Analog Transmission. Digital Transmission – Digital to Digital Conversion, Line Coding, Unipolar Encoding, Polar Encoding, Bipolar Encoding, block Coding Analog Transmission - Analog-to-

Digital Conversion, Digital to analog Conversion, Analog to Analog Conversion. Sampling, Quantization, Encoding, Transmission Modes.

Module 3: Wireless Communication. **No. of lectures**: 6

Learning Outcomes: Students will be able to explain

6. Various method of signals transmission.
7. Principles of wireless communication and space time coding.
8. Types of networks, routing protocols,

Radio, Microwave, Infra-red, Light Transmission. Wireless Communication Standards, Characterization of the Wireless Channel, Receiver Techniques for Fading Dispersive Channels, Mobility Management in Wireless Networks, Mobile IP, Mobile Ad hoc Networks, Ad hoc Routing Protocols, Performance Analysis of DSR and CBRP, Cluster Techniques, Incremental Cluster Maintenance Scheme, Space time Coding for Wireless Communication.

Module 4: Data Link Layer Technologies. **No. of lectures:**6

Learning Outcomes: Students will be able to explain

4. Types of routing, network layer protocol, multiplexing techniques.
5. Types of networks, IP addressing schemes, Error detection and correction.

Types of Network Routing, Network Layer Protocols. FDM, TDM and CDMA. Circuit and packet switching. Frame relay and ATM switching. ISDN. Local area network protocols. Fibre optic networks. Satellite networks. Data link layer design issues: its functions and protocols. Internet protocol. Routing algorithms. Congestion control algorithms. IP addressing schemes. Internetworking and sub-netting. Error Detection and Correction - Types of Errors, Detection, Correction Switching and Data link layer, data link control and protocols.

Module 5: Transmission Media & Transmission Control protocol **No. of lectures**: 6

Learning Outcomes: Students will be able to explain

3. Different Media for data transmission.
4. Principles of transmission control protocol.

Magnetic Media, Twisted Pair Cable, Coaxial Cable, Power Lines, Fiber Optics. Protocol– Features, Header, Addressing, Connection Management, Error Control and Flow Control, Multiplexing, Congestion Control, Timer Management, Crash Recover.

References:

S. No.	Title of Book	Author	Publication
1	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl. 4th Ed., Oxford University Press.
3	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
4	Digital Communication: Fundamentals	Sklar, B., and Ray, P.K	2nd Ed., Dorling

	and Applications		Kindersley
5	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley
6	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall

Electronics Simulation Lab

Course Code	ECPC-602
Course Title	Electronics Simulation Lab
Number of Credits	2 (L: 0, T: 0, P: 4)
Prerequisites	Electronics Device and circuits
Course Category	PC

Course Outcome:-

Students will be able to:-

C.O.1: Demonstrate the VI Characteristics of Diode, Zener Diode.(K2)
C.O.2:Illustrate the operation of Half-wave, Full-wave rectifier and bridge rectifier.(K2)
C.O.3: Interpret the Characteristics CS and CE Amplifier.(K2)
C.O.4: Verify the matrix operationsinScilab.(K2)
C.O.5:Analyze the function of AM, FM, LPF,HPF.(K4)
C.O.6: ModelLaplace transform, Fourier Transform, Polynomial in Scilab.(K3)

List of Practical's/ Activities ***(To perform minimum 6 practical, taking at least 3 from each section).***

Design and analysis of the following circuits in any Electronics CAD Software (not limited to):

1. Study the VI Characteristics of Diode, Zener Diode
2. Verification of Half-wave and Full-wave rectifier
3. Verification of Full wave bridge rectifier.
4. Frequency Response of CE Amplifier.
5. Frequency Response of CS Amplifier.
6. Verification of Amplitude Modulation and Demodulation.

Design and analysis of the following circuits in Scilab(not limited to):

1. Study of Basics of Scilab.
2. Matrix operation (addition, subtraction, multiplication, division, transpose, inverse etc.)
3. Laplace transform, Fourier Transform, Polynomial etc.
4. Simulation of AM
5. Simulation of FM
6. Simulation of LPF and HPF

Medical Electronics

Course Code	ECPE-603/A
Course Title	Medical Electronics
Number of Credits	3(L: 3, T: 0, P: 0)
Prerequisites	NIL
Course Category	PE

Course Objectives: After completing the course, the students will able to:-

CO 1: Outline the concepts about the various electrical and non-electrical physiological parameters(K2)
CO 2: Demonstrate the methods of recording and also the method of transmitting these parameters. (K2)
CO 3: Identify the various assist devices used in the hospitals.(K3)
CO 4: Illustrate about equipment used for physical medicine. (K2)
CO 5: Explain about various recently developed diagnostic and therapeutic techniques.(K2)

Module I - Electro-Physiology and Bio-Potential recording (8 hours)

Learning Outcomes:-

Students will be able to
1) Be familiar with the concept of Electro-physiology.
2) Explain the operation of ECG, EEG, EMG, PCG, lead systems and recording methods.

The origin of Bio-potentials; bio-potential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

Module II - Bio-Chemical and Non Electrical Parameter Measurement (8 hours)

Learning Outcomes:-

Students will be able to
1) Be familiar with the concept of bio-chemical.
2) Understand the character of chemical reactions in living organisms.

3) Be familiar with the basic concept and characteristics of non electrical parameter.

pH, PO2, PCO2, colorimeter, Auto analyzer, Blood flow meter, cardiac output, Respiratory measurement, Blood pressure, temperature, pulse, Blood Cell Counters.

Module III - Assist Devices (8 hours)

Learning Outcomes:-

Students will be able to

1) Be familiar with the function of pacemakers in human heart.
2) Understand the function of DC Defibrillator & dialyser.
3) Know the working principle of Heart lung machine.

Cardiac pacemakers, DC Defibrillator, Dialyser, Heart lung machine.

Module IV - Physical Medicine and Biotelemetry (8 hours)

Learning Outcomes:-

Students will be able to

1) Be familiar with the different physical medicine.
2) Understand the ultrasonic and microwave type and their applications.
3) Be familiar with the basic concept of Diathermy Telemetry principle.

Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radiopill, electrical safety.

Module V - Recent Trends in Medical Instrumentation (8 hours)

Learning Outcomes:-

Students will be able to

1) Be familiar with the different medical instruments.
2) Understand the circuit configuration for cryogenic application..

Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine.

References:

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, New Delhi, 2007.
2. John G.Webster, "Medical Instrumentation Application and Design", 3rd Edition, Wiley India Edition, 2007.
3. Khandpur, R.S., "Handbook of Biomedical Instrumentation", TATA McGraw-Hill, NewDelhi, 2003.
4. Joseph J.Carr and John M.Brown, "Introduction to Biomedical equipment Technology", John Wiley and Sons, New York, 2004.

VLSI

Course Code	ECPE-603/B
Course Title	VLSI
Number of Credits Prerequisites	3 (L:3,T:0,P:0) NIL
Course Category	PE

Course Outcome:-

After completion of the course, students will be able to:

C.O.1:Interpret MOS based system**(K2)**

C.O.2:Explain the working of MOS Inverter**(K2)**

C.O.3:Illustrate MOS Circuits.**(K2)**

C.O.4:ApplyVHDL Programs related to Fundamental Arithmetic operations **(K3)**

C.O.5:Develop VHDL Programs related to Sequential circuitsand Combinational circuits **(K3)**

Unit I. Digital System and MOS Transistor:

Learning Outcomes:

Students will be able to:

1.Describe design methodologies and detail of Y Chart.

2.Describe different domain and Define different terms regarding design Hierarchy.

3.Explain the types of FPGA Technology.

4.Explain MOSFET current-voltage Characteristics .

1.1 VLSI design flow, Y chart, Practical design flow 1.2 Design Hierarchy Structural Decomposition in the physical (geometrical) domain 1.3 FPGA, Gate Array Design, Standard Cell Based Design, Full Custom Design 1.4 MOS structure 1.5 MOS system under external bias 1.6 Structure and operation of MOSFET transistor 1.7 MOSFET current-voltage Characteristics.

Unit–II. MOS Inverters:

Learning Outcomes:

Students will be able to:

1.Describe inverter circuit with saturated and Linear Enhancement and Depletion type load.

2. Compare enhancement load NMOS and Depletion Load NMOS.

3.Explain CMOS Inverter with Different Operating Modes of nMOS and pMOS transistor

2.1 MOS Inverter : concept and working 2.2 Resistive load Inverter 2.3 Inverter with n-type MOSFET Load, Enhancement load NMOS, Depletion Load NMOS 2.4 Enhancement load and Depletion Load NMOS 2.5 CMOS Inverter: Circuit operation and description 2.6 Cascaded CMOS Inverter stage.

Unit–III. MOS Circuits:

Learning Outcomes:

Students will be able to:

1.Explain two input NAND and NOR Gate with depletion NMOS load.

2.Explain Two input NAND and NOR Gate using CMOS logic Design simple XOR function.

3.Describe the working of SR latch circuit .

4.Distinguish Clocked latch and Flip -Flop circuit.

3.1 Combinational MOS Logic Circuits 3.2 CMOS logic circuits 3.3 Complex logic circuit 3.4 Sequential MOS circuit 3.5 VLSI Technology-Environment & Processes in brief.

Unit-IV. Introduction to VHDL:

Learning Outcomes:

Students will be able to:

1.Explain to VHDL Programming methodology

2.Understand VHDL Programs related to basic logic gate.

3.Understand VHDL Programs related to Fundamental Arithmetic operations.

4.1 Data flow, behavioural, structural 4.2 Logic operations viz.AND,OR,NOR,NAND,NOT,EXOR

,EXNOR etc. 4.3Adder and Subtractor.

Unit-V

:VHDLProgramming

:

Learning Outcomes:

Students will be able to:

1. Demonstrate VHDL Programs related to Combinational circuits.

2. DemonstrateVHDL Programs related to Sequential circuits.

5.1 Combinational circuits-

Multiplexer and Demultiplexer, Decoder andEncoder.

5.2 4 bit Parallel Adder.

5.3 Parity Generator and paritychecker.

5.4 Basic sequential circuits- SR D Latch, RS, T, JK Flip flop

5.5 Parallel input Parallel output

Shift Register, Up Counter,

Down Counter

.

Signal and System

Course Code	ECPE-603/C
Course Title	Signal and System
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	Mathematical foundation
Course Category	PE

Course objectives: After completing the course, the students will be able to-

CO1: Identify classification of signals and systems (K3)
CO2: Applybasic operations on signal (K3)
CO3: ApplyFourier transform for frequency analysis (K3)
CO4: Demonstrate Laplace transform, Z-transform technique for signal analysis (K2)
CO5: Identify issues related to sampling of an analog signal (K3)

Module 1: (8 hrs): Introduction to signal and systems

Learning Outcomes:-

Students will be able to

1) Demonstrate the classification of signals.
2) Illustrate operations on signals.
3) Explain the convolution and correlation operations.

Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity –unit impulse – unit step – Operations on signals-addition, multiplication, differentiation, integration - Transformation of independent variable of signals: time scaling, time shifting, time reversal. System properties: Linearity, Causality,

time invariance and stability. Introduction to convolution and correlation.

Module 2: (8hrs)Fourier series andtransformation:

Learning Outcomes:-

Students will be able to

1) Outline the process of Fourier series analysis of a signal.
2) Demonstrate the Fourier transformation of continuous and discrete time signals.

Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function.

Module 3: (8hrs): Sampling Theorem

Learning Outcomes:-

Students will be able to

1) Demonstrate the process of signal sampling.
2) Illustrate the reconstruction of signal.
3) Identify the issues related to sampling and reconstruction of an analog signal.

Representation of continuous time signals by its sample –Types of sampling, Sampling theorem. Reconstruction of a Signal from its samples, aliasing –sampling of band pass signals.

Module 4: (8hrs)Laplace Transforms:

Learning Outcomes:-

Students will be able to

1) Demonstrate the process of Laplace transformation.
2) Explain the concept of ROC for Laplace transform.
3) Illustrate properties of Laplace Transform.

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's relation between L.T's, and F.T. of a signal.

Module 5: (8hrs)Z-Transforms:

Learning Outcomes:-

Students will be able to

1) Demonstrate the z-transform and ROC evaluation process.
2) Compare Z-transform with Fourier transform.
3) Illustrate inverse z transform methods.

Basic principles of z-transform - z-transform definition –, Relationship between z-transform and Fourier transform, region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion

References:

1) Signals and Systems by Tarun KumarRawat.
2) Circuits and Systems: A Modern Approach" by A. Papoulis
3) Signals and Systems: Continuous and Discrete" by R.F. Ziemer, W.H. Tranter and D.R. Fannin.
4) Signals and Systems" by A.V. Oppenheim, A.S. Willsky and I.T. Young.
5) Signals and Systems : Pearson New International Edition" by Alan V Oppenheim, S. Hamid, Alan S. Willsky.
6) Problems and Solutions in Signals and Systems" by R. Gopal.
7) Continuous and Discrete Signals and Systems" by Samir S. Soliman, Mandyam D. Srinath

Entrepreneurship and Start-up's

Course Code	:	HS-604
Course Title	:	Entrepreneurship and Start-ups
Number of Credits	:	4 (L:3, T:1, P:0)
Prerequisites (Course code)	:	None
Course Category	:	HS

CO1 Understand the basic concepts of Entrepreneurship and Startups.

CO2 Illustrate skills of discovering business ideas, visualizing and planning a business.

CO3 Analyze market and business risk for strategy development.

CO4 Demonstrate skills of organizational management.

CO5 Exhibit knowledge of financing methods, institutions and skills for communication of ideas.

Course Content:

Unit1-Introduction and Basics of Entrepreneurship and Start–Ups

Suggestive Learning Outcomes:

(1) Describe the Basic Elements of Entrepreneur and Entrepreneurship

(2) Distinguish between Entrepreneur, Manager and Intrapreneur

Content:

- Definitions, Traits of an entrepreneur, Factors influencing entrepreneurship, Types and Functions of Entrepreneurs, Need for promotion of entrepreneurship, Intrapreneur, Motivation
- Role of Entrepreneurs in Economic Development
- Similarities/differences between - Entrepreneur and Manager, Entrepreneur and Intrapreneur.

Unit2–Business Ideas and their implementation

Suggestive Learning Outcomes:

(1) Illustrate different Types of Business Planning and Business Structure
(2) Select specific Institutions Assisting Entrepreneur

Content:

- Discovering ideas
- Visualizing the business
- Business Plan, - Types of planning, Importance of planning, Steps in planning
- Types of Business Structures
- Institutions assisting entrepreneur

Unit3–**Idea to Start-up**

Suggestive Learning Outcomes:

(1) Identify Steps for Starting a SSI
(2) Predict the Target Market and Associated Risk

Content:

- Market analysis – Identifying the target market
- Competition evaluation and Strategy Development
- Steps for starting a small enterprise
- Risk analysis

Unit4–Management of Enterprise

Suggestive Learning Outcomes:

(1) Apply the Basic Accounting Concepts in Business
(2) Demonstrate Knowledge of Pricing, Positioning and Advertising of Products

Content:

- Recruitment and management of talent.
- Determinants of Price, Pricing methods in practice.
- Market Positioning, Advertising and Sales Promotion
- Accounting - Understanding basics of Transaction, Journal, Ledger, Cashbook, Trial

Balance, Cost Sheet and Final Accounts through simple problems

Unit5-Financing and Communication of Ideas

Suggestive Learning Outcomes:

(1) Exhibit Knowledge of various Financial Institutions and Financing Methods
(2) Illustrate Business Ideas through Communication Skills

Content:

- Financial Institutions
- Financing methods available for start-ups in India
- Communication of Ideas to potential investors–Investor Pitch

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN–978-0984999392
2.	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN–978-0670921607
3.	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN–978-0755388974
4.	Entrepreneurship	Alpana Trehan	Dreamtech PressISBN: 978-93-5004-026-3
5	Marketing and Sales Management	D C Kapoor	S Chand and Company Ltd. ISBN: 81-219-2430-8
S.No.	**Title of Book**	**Author**	**Publication**
6	Business Economics	H L Ahuja	S Chand and Company Ltd. ISBN: 81-219-1791-3

7	Financial Accounting (Principles and Practice)	Jawahar Lal & Seema Srivastava	S Chand Publishing
8	Accounting for Management	N.P. Srinivasan & Sakthivel Murugan	S Chand Publishing
9	Marketing	Harsh V Verma and Ekta Duggal	Oxford University Press ISBN: 0-19-945910-X
10	Marketing (Asian Edition)	Paul Baines, Chris Fill, Kelly Page and Piyush K. Sinha	Oxford University Press
11	Entrepreneurship	Rajeev Roy	Oxford University Press ISBN: 0-19-807263-5
12	Entrepreneurship Development	Kumar S Anil	New Age Publishers
13	Human Resource Management	Uday Kumar Haldar and Juthika Sarkar	Oxford University Press
14	Fundamentals of Entrepreneurship	S K Mohanty	Prentice Hall of India Private Limited ISBN: 81-203-2867-1
15	Entrepreneurship Development	S Skhanka	S Chand and Company Ltd. ISBN: 81-219-1801-4

SUGGESTED SOFTWARE/LEARNINGWEBSITES:

a. https://www.fundable.com/learn/resources/guides/startup
b. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate- structure/
c. https://www.finder.com/small-business-finance-tips
d. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

Indian Constitution

Course Code	:	AU-606
Course Title	:	Indian Constitution
Number of Credits	:	0 (L: 2, T:0; P:0)
Prerequisites	:	None
Course Category	:	AU

Course Outcomes:

CO1. Illustrate Preamble, Basic Structure, Fundamental Rights and Duties of Indian Constitution(K3).

CO2. Discuss the Structure of The Indian Union Government (K2).

CO3. Memorize the Role andPower of Governor, Chief Minister and Council ofMinisters and explain the role of State Secretariat (K2).

CO4. Describe the role of Local Administration (K2).

CO5. Explain the Role andFunctioning of Election Commission (K2).

Detailed Course Content:

Unit 1 – The Constitution – Introduction

Number of Class hours:06

Learning Outcomes:

1. Describe the History of the Making of the IndianConstitution (K2)
2. Illustrate Preamble and the Basic Structure of Indian Constitution (K3)
3. Illustrate the Fundamental Rights and Duties set by Indian Constitution (K3)

Detailed content of the unit:

1. The History of the Making of the IndianConstitution
2. Preamble and the Basic Structure, and itsinterpretation
3. Fundamental Rights and Duties and theirinterpretation
4. State PolicyPrinciples

Unit 2 – Union Government

Number of Class hours:06

Learning Outcomes:

1. Discuss the Structure of the IndianUnion Government (K2).
2. Memorize the Role and Power of President, Prime Minister and Council of Ministers of India (K1)
3. Explain the role of Lok Sabha and RajyaSabha (K2)

Detailed content of the unit:

1. Structure of the IndianUnion
2. President – Role andPower
3. Prime Minister and Council ofMinisters
4. Lok Sabha and RajyaSabha

Unit 3 – State Government

Number of Class hours:06

Learning Outcomes:

1. Memorize the Role and Power of Governor, Chief Minister and Council ofMinisters of a state(K1)
2. Explain the role of StateSecretariat (K2)

Detailed content of the unit:

1. Governor – Role andPower
2. Chief Minister and Council ofMinisters
3. StateSecretariat

Unit 4 – Local Administration

Number of Class hours:06

Learning Outcomes:

1. Describe the role of District Administration (K2)
2. Explain the role of MunicipalCorporation (K2)
3. Discuss the role of Zila Panchayat (K2)

Detailed content of the unit:

1. DistrictAdministration
2. MunicipalCorporation
3. Zila Panchayat

Unit 5 – Election Commission

Number of Class hours:06

Learning Outcomes:

1. Explain the Role andFunctioning of Election Commission (K2)
2. Classify the role and functioning of Chief ElectionCommissioner and State Election Commissioner (K2).

Detailed content of the unit:

1. Role andFunctioning of Election commission
2. Chief ElectionCommissioner
3. State ElectionCommission

Suggested Learning Resources:

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the In- dian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Consti- tution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

a. https://www.constitution.org/cons/india/const.html
b. http://www.legislative.gov.in/constitution-of-india
c. https://www.sci.gov.in/constitution
d. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/

Major Project - II

Course Code	ECPR-607
Course Title	Major Project
Number of Credits	3 (L: 0, T: 0, P: 6)
Prerequisites	Nil
Course Category	Project Work (PR)

Course Outcome:-

After completion of the course, students will be able to:

C.O. 1: Demonstrate a sound technical knowledge of their selected project topic and the knowledge, skills and attitudes of a professional engineer (K2).

C.O. 2: Develop the skill of working in a Team (K3).

C.O. 3: Design engineering solutions to complex problems utilising a systems approach (K6).

C.O. 4: Design the solution of an engineering project involving latest tools and techniques (K6).

C.O. 5: Develop the skill of effective communication with engineers and the community at large in written an oral forms (K3).

Course Content:-

The major project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The course should provide the scope to develop the following by the students-

1) Develop sound knowledge about the domain of the project work.
2) Perform detailed study about various components of a project.
3) Learn to be an important member of a team for successful execution of a project work.
4) Study about methodologies and professional way of documentation and communication related to project work.
5) Develop idea about problem formulation, finding the solution of a complex engineering problem.
6) Develop project report as per the suggested format to communicate the findings of the project work.
7) Acquire the skill of effective oral communication to the fellow engineers and people in the society at large.
8) Knowledge of how to organize, scope, plan, do and act within a project thesis.
9) Familiarity with specific tools (i.e. hardware equipment and software) relevant to the project selected.
10) Demonstrate the implementation of a major project work.

Seminar

Course Code	ECSE-608
Course Title	Seminar
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Nil
Course Category	Seminar

Course Outcome:-

After completion of the course, students will be able to:

C.O.1: Demonstrate a thorough and systematic understanding of a seminar topic (K2).

C.O. 2: Identify the methodologies and professional way of documentation and communication (K3).

C.O.3: Demonstrate the ability to construct a report consistent with expectations of the topic, including an appropriate organization, style, voice, and tone (K3).

C.O.4: Develop the ability to follow discussions, oral arguments, and presentations, noting main points or evidence and tracking through different comments given by the audience (K3).

C.O.5: Developthe communication skill as a speaker (K3).

Course Content:-

The seminar topics may be any aspect of the science and technology, entrepreneurship or any contemporary social issues to be solved by specific branch of engineering and technology (For example, Water logging problems in a particular city may be a seminar topic for Civil Engineering Students) must be approved by the instructor in advance.

The course should have the following-

7) Practice speaking in front of a scientific audience.
8) Explore topics in detail.
9) Research topics and organize presentations.
10) To improve as speakers, each student will receive feedback from the fellow students and the instructor.
11) PowerPoint, Key Note or overheads are acceptable media for Visual aids. Visual aids should look professional and be readable in the entire room; use spell check and proofread for typographical errors.
12) Students have to submit a hard copy contains detailed outline (4-5 pages) of their presentation and also a brief abstract (one or two paragraphs; **250 words max.**) describing their presentation.
13) Each student will give 20-minute presentations followed by 3 minutes of question-answer session.

Proposal Seminar Format for Students:

- Introduce yourself.
- Give an introduction and background information on your topic. What relevant research has been performed previously?

- State the problem(s) that remain unanswered.
- Clearly state your objectives and give the specific hypotheses you wish to test.
- Describe the methodology you will use to test your hypotheses. Be sure you fully understand your chosen methods. Give reasons why you chose these methods over other approaches.
- Present any data you have collected thus far.
- Describe what remains to be done, and what you expect to find.
- Explain the significance of your findings (or potential future findings).

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