CHOICE BASED CREDIT SYSTEM (CBCS)

WITH

LEARNING OUTCOMES BASED CURRICULAR FRAMEWORK (LOCF)

FOR

B.SC. ELECTRONIC SCIENCE

UNDERGRADUATE PROGRAMME
(EFFECTIVE FROM ACADEMIC YEAR 2021-2022)

Department of Electronic Science

Faculty of Electronics

Government College for Women

Parade Ground Jammu- 180001

Semester-III

Title: Linear Integrated Circuits Total Marks: 100
Course Code: UETTC-301 Credits: 04
Internal Examination: 20marks End Semester Examination: 80 marks
Duration: 3hours

Aims and Objectives of the Course

- To impart the knowledge of Cathode Ray Oscilloscopes, their importance in the field of Electronic science and their various types.
- To give the detail knowledge of Analog IC like 741 opamp, their types and applications.
- To provide the knowledge of various types of Advance level IC like 555 Timer, VCO, PLL and their applications in the field of electronic science.

Oscilloscopes

Unit I

CRO: Block diagram and basic operation, CRT, Electrostatic focusing and deflection, CRT screen,Aquadaq coating, CRT circuits, vertical deflection systems, horizontal deflection systems, delay line,Triggering Circuit, Time Base Generator, Electron Gun Assembly, Pre accelerating anode, oscilloscope probes: Types of Probes, oscilloscope techniques, measurement of frequency, phase angle and time delay, types of CRO: Dual trace, digital storage oscilloscopes, Sampling Oscilloscope.

Transducers

Unit II

Classification of transducers: Potentiometric, Capacitive and Inductive, oscillation, LVDT, strain gauge,derivation of Gauge factor, Piezo-electric, photoelectric, Hall effect Transducers, velocity, resistance thermometers: thermocouple and thermistors,RTD Photosensitive devices: Photoconductive and Photovoltaic Cells.

Basic Operational Amplifiers

Unit III

Introduction and brief history of op-amp 741,Concept and working of differential operationalamplifiers and block diagram of an OP-AMP (**741-IC**), Types of op-amp, configuration and categories.

OP-AMP Parameters: input offset voltage, input offset current , input bias current, differential input resistance,Total offset voltage, input capacitance, offset voltage adjustment range, input

voltage range, CMRR, slew rate, Thermal drift.SVRR, OP-AMP in open and close loop configuration, inverting, Non inverting, summing and difference amplifier, integrator, differentiator, V-I, I-V converter, Peak detector, (10% marks will be given to numerical).

Comparators and Signal Generators

Unit IV

Introduction to comparators: Basic comparators, inverting and non inverting, practical comparators, Level detector, voltage limiters, phase shift oscillator, wein- bridge oscillator,Colepitt's oscillator, Hartley's oscillator, crystal oscillator,Schmitt trigger,Hysteresis loss, square wave generator, triangular wave generator,

Multivibrators (IC-555)

Unit V

555: Introduction and Block diagram of 555 Timer, a stable, Monostable and Bistable,Applications of 555 Timer, V-F, F-V (VCO) converters,Frequency conversion factor (K), introduction and applications of PLL, Frequency translation, demodulation.

Practical Semester III

Title: Linear Integrated Circuits Lab Course code: UETTC-302
Total Marks= 50 Credit: 02
Internal practical examination= 25 External Practical Examination= 25
Duration=03 hrs

Aims and Objectives of the course

- To train the students to implement analog integrated circuits using 741 opamp.
- To practically allow the students to analyze and operate CRO for various operations.
- To provide the practical knowledge of usage of special purpose IC's like 555 Timer, PLL and VCO in various electronic circuits.

List of Practical in semester- III

1. To design an amplifier of a given gain for an inverting and non inverting configuration using OPAMP IC- 741.
2. To design an integrator using OPAMP for a given specification and study its waveform.
3. To design a differentiator using OPAMP for a given specification and study its waveform.
4. To design adder/Subtractor using OPAMP for a given specification.
5. To design 555 Timer in Astable/Monostable mode.
6. To design a Square wave generator using OPAMP.
7. To design a Triangular wave generator using OPAMP.
8. To design a V-F converter using OPAMP.
9. To study 741 opamp as half wave and full wave rectifier
10. To study 741 opamp as peak detector.
11. To study 741 opamp as regenerative comparator and calculate hysteresis loss.

Books Recommended:

1. Electronic Instrumentation and Measurement Techniques- W.D.Cooper& A.D Helfrick, Prentice Hall of India.
2. A course in Electrical and Electronic Measurements and Instrumentation- A.K. Sawhney, DhanpatRai and Sons.
3. Operations of Operational Amplifier: Ramakant Gayakwad.
4. Linear Integrated Circuits: D. Roy Chowdhary&SahilB.Jain.

Semester- III Skill Course

Title:Electronics Workshop **Code: UETTS-301**

Credits:02 Total Marks: 50
InternalExamination: 10marksEnd Semester Examination: 40marks
Duration: 2hours

Aims and Objectives of the Course

- To enable the students to design and troubleshoots the electrical circuits, networks and appliances through hands-on mode.
- To give the detail knowledge of Electrical circuits, their parameters, measurements and analysis.

Unit I: Basic Electricity Principles&Electrical Circuits:

a) Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations.
b) AC and DC Electricity. Familiarization with multimeter, voltmeter and ammeter.
c) Basic electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements.
d) Real, imaginary and complex power components of AC source, Power factor, Saving energy and money.

Unit II: Solid-State Devices:

a) Resistors, inductors and capacitors and their types
b) Diodes and rectifiers, clippers & Clampers, Rectifiers efficiency and ripple factor.
c) Components in Series or in shunt. Response of inductors and capacitors with DC or ACsources.
d) Bipolar junction Transistor (BJT): PNP and NPN transistors, basic transistor action, early effect, input and output characteristics of CB,CE and CC configurations, biasing techniques stabilization and bias compensation

Reference Books:

- Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
- A text book in Electrical Technology - B L Theraja - S Chand & Co.
- A text book of Electrical Technology - A K Theraja
- Performance and design of AC machines - M G Say ELBS Edn.

Practical Semester III

Title: Electronics workshop Lab **Course code: UETTS-302**
Total Marks= 50 **Credit 02**
Internal Practical Examination= 25External Practical Examination= 25
Duration=03 hrs

Aims and Objectives of the Course

- To enable the students to Design and practically verify rectifier circuits.
- To design and testing of Zener diode as voltage regulator
- To impart knowledge about transistors and their biasing techniques.

List of Practical in semester- IV

1. To study half wave rectifier---with and without shunt capacitance filter.
2. To study centre tapped full wave rectifier---with and without shunt capacitance filter.
3. To study Zener diode as voltage regulator---load regulation.
4. Design , fabrication and testing of a 9v power supply with Zener regulator
5. Designing of a CE based amplifier of a given gain.
6. Design and study of Transistor biasing techniques.
7. Study of the frequency response of series LCR circuit and determination of its:-

   a. Resonant Frequency

   b. Impedance at resonance

   c. Quality factor (Q)

   d. Bandwidth

Books Recommended:

- Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
- A text book in Electrical Technology - B L Theraja - S Chand & Co.
- A text book of Electrical Technology - A K Theraja
- Performance and design of AC machines - M G Say ELBS Edn.

Semester- IV

Title: Digital Electronics Course Code: UETTC-401
Credits: 04 Total Marks:100
Internal Examination: 20marks End Semester Examination: 80marks
Duration: 3hours

Aims and Objectives of the Course

- To impart the knowledge of Digital fundamentals, digital circuits and how to use them.
- To give the detail knowledge of Digital conversion process, codes and converters..
- To provide the knowledge of various digital memories, AD-DA converters.

Number System and Codes

Unit I

Decimal, binary, hexadecimal, octal, conversion of one code to another, compliments (1's and 2's), signed and unsigned numbers, 1's and 2's arithmetic,addition and subtraction, multiplication and division, binary codes: bcd,excess3 and gray, binary conversion and ASCII.

Logic gate and Boolean algebra: Working and Truth tables, OR, AND, NOT, EXOR, EXNOR, Universal (NOR and NAND) gates, Universal properties, Boolean theorems, Identities, Demorgans theorem and principle of duality.

Digital Logic Family: Fan in, Fan out, Noise Margin, Power dissipation, current and voltage, operating temperature, frequency, voltage levelparameters in RTL, DTL, HTL, TTL: Totem pole,wired logic and tri stated configuration,MOS and CMOS.(15% marks will be given to numericals)

Combinational Logic Analysis and Design

Unit II

Boolean identity rules, minimization technique,Standard representation of Logic functions (SOP and POS), Karnaugh map minimization (up to 4 variables), Implementation of logic functions via logic gates.Multiplexers (2:1, 4:1, 8:1), Demultiplexers (1:2, 1:4, 1:8), Designing of MUX and DE MUX, implementing logic functions with multiplexers, adders and Subtractors (half and full), Encoders and Decoders- Types.

Sequential Logic

Unit III

Introduction to types of sequential logic circuits,Latches, Flip Flops: SR, D, JK, Master Slave, T Flip Flops,Race Around Condition, clocked FF, Counters (Ripples, Synchronous and

Asynchronous, Up-Down, Ring, Johnson,Modulo-n,Counters with truncated sequence), state table.Timing Diagram.

Memories

Unit IV

Registers: SISO, SIPO, PISO, PIPOstructure and working, Shift registers: Unidirectional, bidirectional, general memory operations, ROM, RAM (static and dynamic), PROM, EPROM, and EEPROM.Designing of RAM.

AD and DA Converters

Unit V

DAC's specifications, DAC's types: binary weighted resisters, R-2R ladder, ADC's specifications, ADC's types: successive approximation, simultaneous AD conversion, Counter method, continuous AD conversion and Dual slope method.

Practical Semester IV

Title: Digital Electronics Lab **Course code: UETTC-402**
Total Marks= 50 **Credit: 02**
Internal practical examination= 25External Practical Examination= 25
Duration=03 hrs

Aims and Objectives of the Course

- To enable the students to Design and practically verify all the logic gates.
- To give the detail knowledge of Digital memories, types of memories and their association.
- To impart knowledge about combinational and sequential logic circuits and their experimental verifications.

List of Practical in semester- IV

8. To verify and design AND, OR, NOT, and EX-or using NAND/ NOR gates.
9. To convert a Boolean expression into a logic gate circuit and assemble using logic gate IC's.
10. Design a Half Adder and Full Adder.
11. Design a Half Subtractor and Full Subtractor.
12. Design 4:1 Multiplexers using Logic gates.
13. Design a DA and AD converters of given specifications.
14. Design a 4 bit counter using D/T/JK FF.
15. To realize NAND/NOR/NOT using Transistor/MOS IC.
16. To implement De Morgan's theorem
17. To verify the working of shift registers.

Books Recommended:

1. R. P. Jain, Modern Digital Electronics, Tata McGraw Hill.
2. M. Morris Mano, Michael D. Ciletti, Digital design, Pearson Education Asia.
3. Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia
4. Digital Fundamental and Design: S.Salivahanan, S. Arivahanan

Semester- IV Skill Course

Title:Power ElectronicsCourse Code: UETTS-401
Credits:02 **Total Marks: 40**
Internal Examination: 10marks **End Semester Examination: 40marks**
Duration: 2hours

Aims and Objectives of the Course

At the end of this course students will be able to

- Explain the basic principles of switch mode power conversion, models of different types of power electronic converters including dc-dc converters, PWM rectifiers and inverters
- Choose appropriate power converter topologies and design the power stage and feedback controllers for various applications They use power electronic simulation packages for analyzing and designing power converters
- Describe the operation of electric machines, such as motors and generators and their electronic controls.
- Analyze the performance of electric machine

Syllabus Contents

Unit- 1

a) Power Devices: Need for semiconductor power devices, Power diodes, Enhancement of reverse blocking capacity, Introduction to family of thyristors.
b) Silicon Controlled Rectifier (SCR): structure, I-V characteristics, Turn-On and Turn-Off characteristics, ratings, Factors affecting the characteristics/ratings of SCR, Gate-triggering circuits, Control circuits design and Protection circuits, Snubber circuit.
c) Diac and Triac: Basic structure, working and V-I characteristic of, application of a Diac as a triggering device for a Triac. Insulated Gate Bipolar Transistors (IGBT): Basic structure, I-V Characteristics, switching characteristics, device limitations and safe operating area (SOA) etc.
d) Application of SCR: SCR as a static switch, phase controlled rectification, single phase half wave, full wave and bridge rectifiers with inductive & non-inductive loads; AC voltage control using SCR and Triac as a switch. Power MOSFETs: operation modes, switching characteristics, power BJT.

Unit- 2

a) Power Inverters: Need for commutating circuits and their various types, d.c. link invertors, Parallel capacitor commutated invertors with and without reactive feedback and its analysis,
b) Series Invertor, limitations and its improved versions, bridge invertors.
c) Choppers: basic chopper circuit, types of choppers (Type A-D), step-down chopper, step-up chopper, operation of d.c. chopper circuits using self commutation (A & B-type commutating

circuit), cathode pulse turn-off chopper(using class D commutation), load sensitive cathode pulse turn-off chopper (Jones Chopper), Morgan's chopper

d) Electromechanical Machines: DC Motors, Basic understanding of field and armature, Principle of operation, EMF equation, Back EMF, Factors controlling motor speed, Thyristor based speed control of dc motors, AC motor (Induction Motor only), Rotor and stator, torque & speed of induction motor, Thyristor control of ac motors(block diagrams only)

References

1. Power Electronics, P.C. Sen, TMH
2. Power Electronics & Controls, S.K. Dutta
3. Power Electronics, M.D. Singh & K.B. Khanchandani, TMH
4. Power Electronics Circuits, Devices and Applications, 3rd Edition, M.H. Rashid, Pearson Education

Practical Semester IV
Skill Course

Title:Power Electronics Lab **Course Code: UETTS-402**
Credits:02 **Total Marks: 50**
Internal Examination: 25marks **End Semester Examination: 25marks**
Duration: 3hours

Aims and Objectives of the Course

At the end of this course, students will be able to

- Reproduce the characteristics of power semicondcutor devices like SCR, DIAC, TRIAC etc.
- Calculate the various device parameters from their characteristics.
- Design power control circuits using semicondcutor power devices. CO4 Prepare the technical report on the experiments carried.

Syllabus Contents

1. Study of I-V characteristics of DIAC
2. Study of I-V characteristics of a TRIAC
3. Study of I-V characteristics of a SCR
4. SCR as a half wave and full wave rectifiers with R and RL loads
5. DC motor control using SCR.
6. DC motor control using TRIAC.
7. AC voltage controller using TRIAC with UJT triggering.
8. Study of parallel and bridge inverter.
9. Design of snubber circuit
10. VI Characteristic of MOSFET and IGBT (Both) 1
11. Study of chopper circuits

Semester-V
Discipline Specific Course

Title: COMMUNICATION ELECTRONICS Total Marks: 100
Course Code: UETTDSE-501 Credits: 04
Internal Examination: 20marks End Semester Examination: 80marks
Duration: 3hours

Aims and Objectives of the Course

- To enable the students to learn about all the layers of atmosphere, different waves and their existence.
- To give the detail knowledge ofconcept of modulation- Analog and Pulse.
- To impart knowledge about Mathematical fundamentals of Fourier series, their properties and numerical approach.

Unit I: Waves and Antennas:

Frequency spectrum; Propagation of Electromagnetic waves,propagation of waves; free space,Space waves, troposphere, and ionosphere propagation- layers of ionosphere; surface waves; low frequency & very low frequency propagation; ELF propagation; extra- terrestrial communication.

Antenna: Antenna parameters, radiation mechanism, radiation power density, beam width, bandwidth, directivity,Directive gain,antenna efficiency, gain, input impedance and polarization, types of antenna, Hertizian dipole, grounded and ungrounded antennas.Resonant and Non resonant antennas.

Unit II: Fourier transforms: Definition, Properties of Fourier Transforms, linearity, scaling, symmetry, convolution, Time shifting, frequency shifting, Time differentiation, frequency differentiation, Time integration, frequency integration, Duality, Parseval's relation, correction, modulation; Fourier transform of periodic signals,Fourier transform of power signals; Energy spectrum.(15% marks will be based on numericals)

Unit III: Amplitude Modulation and demodulation:

Concept of Modulation, need for modulation and types of modulation.

Amplitude Modulation; representation and frequency spectrum,Bandwidth, modulation index, Power relations; Generation of AM; collector modulator and FET square law modulator, Amplitude Demodulation; Concept of Single side band generation and detection. Single side band techniques, Filter method, third method and phase shift method of ssb generation, suppression of carrier; balanced modulator; detection of AM waves using envelope detector.

Unit IV: Frequency Modulation and demodulation: Frequency Modulation (FM), Wave representation and frequency spectrum;Bandwidth, Bessel's function. Phase Modulation (PM),

modulation index, effects of noise and noise triangle;Calculation of noise component in FM signal,pre-emphasis and de-emphasis; generation of FM; detection of FM; Foster-Seelay discriminator and ratio detector. Equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector).

Unit V: Analog Pulse Modulation:

Sampling theorem, Basic Principles PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing, Digital Pulse Modulation: Need for digital transmission,types and circuits, Pulse Code Modulation, companding, quantisation noise. elimination of noise.

Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying(PSK), and Binary Phase Shift Keying (BPSK)

Practical Semester V
Discipline Specific Course

Title: Electronics Communication Lab **Course code: UETTDSE-502**
Total Marks= 50 **Credit :02**
Internal practical examination= 25 **External Practical Examination= 25**
Duration=03 hrs

Aims and Objectives of the Course

- To enable the students to Design and practically verify various responses of active and passive electrical components using CRO.
- To give the detail knowledge of Analog and Pulse Modulation.
- To impart knowledge about Time division and frequency division multiplexing techniques.

List of Practical in semester- V

1. To design an Amplitude Modulator using Transistor
2. To study Demodulation of AM signal using envelope detector
3. To study FM - Generator and Detector circuit
4. To study AM Transmitter and Receiver
5. To study FM Transmitter and Receiver
6. To calculate the noise component in modulated signal
7. To study Time Division Multiplexing (TDM)
8. To study Pulse Amplitude Modulation (PAM)
9. To study Pulse Width Modulation (PWM)
10. To study Pulse Position Modulation (PPM)
11. To study Phase Modulation (PM).
12. To study about ASK, FSK, PSK shifting techniques.

Reference Books:

- Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
- Digital Signal Processing Principles Algorithm & Applications, J.G. Proakis and D.G. Manolakis, Prentice Hall.
- Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
- Modern Digital and Analog Communication Systems, B.P. Lathi, Oxford Univ Press.
- Electronic Communication systems, G. Kennedy, 3rd Edition, 1999, Tata McGraw Hill.
- Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill Communication Systems, S. Haykin, Wiley India
- Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

SEMESTER V
Generic Elective

Title:ELECTRONIC INSTRUMENTATIONCourse Code: UETTGE-501
Credits:04 Total Marks:100
Internal Examination: 20marksEnd Semester Examination: 80marks
Duration: 3hours

Aims and Objectives of the Course

- To enable the students to learn about various electronic instruments and their usage in the lab.
- To give the detail knowledge of transducers, types and various circuits.
- To impart knowledge about CRO, techniques, circuits, Probes and Applications.

UNIT-I:

Measurements: Accuracy and precision. Significant figures. Error and uncertainty analysis. Shielding and grounding. Electromagnetic Interference.Basic Measurement Instruments: DC measurement-ammeter, voltmeter, ohmmeter,AC measurement, Digital voltmeter systems (integrating and non-integrating). Digital Multimeter; Block diagram principle of measurement of I, V, C. Accuracy and resolution of measurement.Measurement of Impedance- A.C. bridges, Measurement of Self Inductance (Anderson's bridge), Measurement of Capacitance (De Sauty's bridge), Measurement of frequency (Wien's bridge).

UNIT-II:

Power supply: Block Diagram of a Power Supply, Qualitative idea of C and L Filters. Series and Shunt voltage regulators, Line and load regulation, overload and short circuit protection, current fold back.IC Regulators (78XX and 79XX),Adjustable voltage regulators LM723, LM317, LM337.Introduction to switch mode power supply (SMPS) and uninterrupted power supply (UPS).

UNIT-III:

Oscilloscopes: Block Diagram, CRT, Vertical Deflection, Deflection of sensitivity, Horizontal Deflection. Screens for CRT, Oscilloscope probes, measurement of voltage, frequency and phase by Oscilloscope. Digital Storage Oscilloscopes. LCD display for instruments.Signal Generators: Function generator, Pulse Generator, (Qualitative only).

UNIT-IV:

Lock-in-amplifier: Basic Principles of phase locked loop (PLL), Phase detector (XOR & edge triggered), Voltage Controlled Oscillator (Basics, varactor), lock and capture. Basic idea of PLL IC (565 or 4046). Lock-in-amplifier, Idea of techniques for sum and averaging of signals. Applications of PLL.

UNIT-V:

Transducers: Classification of transducers, Basic requirement/characteristics of transducers, Active and Passive transducers,Capacitive transducers,Resistive (Potentiometer- Theory, temperature compensation & applications), Capacitive (variable air gap type), Inductive(LVDT) & piezoelectric transducers. Measurement of temperature (RTD, semiconductor**,** IC sensors, Light transducers (photo resistors & photovoltaic cells).

Reference Books:

- W.D. Cooper and A. D. Helfrick, Electronic Instrumentation and Measurement Techniques, Prentice Hall.
- R. A. Gayakwad, Op-Amps and Linear IC's, Pearson Education.
- E.O. Doebelin, Measurement Systems: Application and Design, McGraw Hill.
- David A. Bell, Electronic Devices and Circuits, Oxford University Press.
- Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Butterworth Heinmann-2008).
- Introduction to measurements and instrumentation, Ghosh, PHI Learning

Practical Semester V
Generic Elective

Title: ELECTRONIC INSTRUMENTATION LAB Course code: UETTGE-502
Total Marks= 50 Credit: 02
Internal Practical Examination= 25External Practical Examination= 25
Duration=03 hrs

Aims and Objectives of the Course

- To enable the students to Design and practically verify various transducers like LVDT, Thermocouple and many more.
- To give the detail knowledge of working of Wheatstone bridge and De Sauty's bridge.
- To impart practical knowledge about Various circuits like RTD, S&H circuits, Thermistors etc

List of Practical in semester- V(Generic Elective)

Note: At least 06 experiments from the following:

1. Measurement of resistance by Wheatstone bridge and measurement of bridge sensitivity.
2. Measurement of Capacitance by De Sauty's bridge.
3. To determine the Characteristics of resistance transducer - Strain Gauge(Measurement of Strain using half and full bridge).
4. To determine the Characteristics of LVDT.
5. To determine the Characteristics of Thermistors and RTD.
6. Measurement of temperature by Thermocouples.
7. Design a regulated power supply of given rating (5 V or 9V).
8. To design and study the Sample and Hold Circuit.
9. To plot the frequency response of a microphone.
10. To determine the Characteristics of Thermistors and RTD.
11. To determine the Characteristics of PV Solar Cell.
12. To determine the Characteristics of Piezoelectric transducer.

Semester- V
Skill Course

Title:Antenna theory and Radio Wave Communication **Code: UETTS-501**

Credits: 02 **Total Marks: 50**

InternalExamination:10marksEnd Semester Examination: 40marks

Duration: 2hours

Aims and Objectives of the Course

- To impart theoretical knowledge to the students and have exposure and hands-on learning on Antenna wherever possible
- To give the detail knowledge of Radio waves and their compositions.
- To impart knowledge about advanced wireless techniques and various devices in the lab.

UNIT-I: ANTENNA THEORY:

Section-01

Antenna as an element of wireless communication system, Antenna radiation mechanism, Types of Antennas, Fundamentals of EMFT: Maxwell's equations and their applications to antennas, Power delivered to antenna.

Section-02

Antenna parameters: Radiation pattern (polarization patterns, Field and Phase patterns), Field regions around antenna, Radiation intensity, Beam width, Gain, Directivity, Polarization, Bandwidth, Efficiency and Antenna temperature.

Section-03

Fundamentals of signal propagation through Antenna, Current and Voltage distribution in Antenna, Hertzian Dipole Antenna, Half Wave Dipole Antenna, Quarter Wave Dipole Antenna, Loop Antenna.

Section-04

Grounded and Ungrounded Antenna, resonant and non resonant Antenna, forward and backward travelling wave Antenna, concept of major and minor lobes, noises and eradication of noise in Antenna signal, noiseless Antenna.

UNIT-II: Propagation of Radio Waves:

Section- 01

Fundamentals of Electromagnetic wave propagation, Frequency spectrum of EM Waves, Applications of EM waves, properties and mathematical representation. Maxwell's equations.

Section-02

Concept of free space, propagation of signal in ionosphere, various layers of ionosphere, Tropospheric wave propagation.Ground waves, Space waves, Space Wave propagation over flat and curved earth, Optical and Radio Horizons.

Section-03

Low frequency (LF) and very low frequency (VLF) wave propagation, sea waves, Extra terrestrial wave propagation. Elementary idea of propagation of waves used in Terrestrial mobile communications.

Section-04

Different modes of propagation:, Surface WavesCritical Frequency, Maximum usable frequency (MUF), Skip distance, Virtual height, Radio noise of terrestrial and extraterrestrial origin,

Reference Books:

- Ballanis, Antenna Theory, John Wiley & Sons.
- Jordan and Balmain, E. C., Electro Magnetic Waves and Radiating Systems, PHI.
- Antenna and Wave Propagation, Yadava, PHI Learning.
- Haykin S. & Moher M., Modern Wireless Communication, Pearson.
- Lee, William C.Y Mobile Communication Design and Fundamentals.

Practical Semester-V
Skill Course

Title: Antennas and Radio Communication Lab **Course code: UETTS-502**
Total Marks= 50 **Credit 02**
Internal practical examination= 25External Practical Examination= 25
Duration=03 hrs

Aims and Objectives of the Course

- To enable the students to design various networks of Antenna and practically test them.
- To give the detail knowledge of types and parameters of antenna and their applicability.
- To impart practical knowledge about various waves in the earth's atmosphere, EM wave propagation and their important parameters.

List of Practical in semester- V(Skill Course)

Note: At least 06 experiments from the following:

1. To design and study Antenna as transmitter.
2. To design and study Receiving Antenna.
3. To determine various important parameters of Antenna Propagation.
4. To study the response of grounded and ungrounded Antennas.
5. To study the response of resonant and non resonant antennas.
6. To study the propagation of EM waves and trace the waveform.
7. To find the critical angle, power distribution and gain in surface wave propagation.
8. To study the response of LF, MF and VLF wave propagation using CRO.

Semester- VI
Discipline Specific Course

Title: C- PROGRAMMING Course Code: UETTDSE-601
Credits: 04 Total Marks:100
Internal Examination: 20marks End Semester Examination: 80marks
Duration: 3hours

Aims and Objectives of the Course

- Toallow the students to gain knowledge about c concepts like constants, keywords, identifiers, arrays, structures, pointers and many more.
- To give the detail knowledge of Pointers and their usage in C language
- To impart Practical knowledge of C programming language using turbo c software.

Unit – I: Introduction and over view of C language,Header files andpre processor directive, The C Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, header files, Data Types, Integer, Floating-Points, Character, Format of C program, Arithmetic,Relational & Logical Operators, Assignment Operators, Increment & Decrement Operators, Operator Precedence & Associatively. Data input and output statements; simple programming examples.

Unit – II: Formatted Input, Formatted Output, escape sequences, Control STATEMENT; Branching: Simple if Statement, if… else Statement,flowcharts, The while STATEMENT, The do-while STATEMENT, The For Statement, Nesting of if else Statements, Switch Statement, conditional Operator, goto Statement, loops, break and continue statement.

Unit – III: Qualifiers, Storage classes, Pointers definition, Declaring Pointer Variables, using pointer variable, Arrays: One, Two and Multi Dimension Arrays, Initialization of one and two dimensional Arrays, Declaring and Initializing String Variables, String Handling Functions.

Unit – IV: Function Definition, Function Calls (call by value & call by address) Returning Value, Types of Functions, Recursion, Passing Arrays to Functions,Passing String to Functions, Scope, visibility and life time of variables, Multi-files programs.

Unit-V: Structures and Unions: Structures definition, declaration, accessing and initialization of variables, Unions. File management in C, Defining, opening, closing a file, input and output operations on files, Error handling during I/O operation and random access of files.

Reference Books:

- C- Programming Language, Schaum S. Series
- Let us C- by Yashwant Kanetkar.
- C Programing Fundamentals by E- Balaguruswami.
- C Fundamentals by Robert Lafore.

Practical Semester VI

Title: C Programming lab **Course code: UETTDES-602**
Total Marks= 50 **Credit: 02**
Internal Practical Examination= 25 **External Practical Examination= 25**
Duration=03 hrs

Aims and Objectives of the Course

- To train the students to gain the practical knowledge of c language programs using turbo c.
- To give the detail knowledge of making of algorithm and flow charts for C concepts.
- To impart knowledge about debugging, compiling and running a C program.

List of Practical in semester- VI

1. To calculate simple and compound interest.
2. Find Factorial of a number
3. To generate table of number
4. To generate Fibonacci series.
5. Find sum of natural numbers
6. Find LCM and HCF.
7. To find Sine of an angle.
8. To find Cos of an angle.
9. To draw a pyramid on screen.
10. To convert decimal to binary and vice-versa.
11. To exponent of a number.
12. To find area of a circle.
13. To find the transpose of a matrix.

SEMESTER VI- Generic Elective

Title:PHOTONIC AND POWER ELECTRONIC DEVICESCourse Code: UETTGE-601
Credits:04 Total Marks:100
Internal Examination: 20marksEnd Semester Examination: 80marks
Duration: 3hours

Aims and Objectives of the Course

- To impart the theoretical knowledge of photonic devices and their usage.
- To give the detail knowledge of usage of fibre optic communications and their practical applicability.
- To impart knowledge about Power electronics and power devices and their usage.

UNIT-I: PHOTONIC DEVICES:

Classification of photonic devices.Interaction of radiation and matter, Radiative transition and optical absorption. Light Emitting Diodes- Construction, materials and operation. Semiconductor Laser- Condition for amplification, laser cavity, hetero-structure and quantum well devices. Charge carrier and photon confinement, line shape function.Threshold current.Laser diode.

UNIT-II: Photo detectors:

Photoconductor. Photodiodes (p-i-n, avalanche) and Phototransistors, quantum efficiency and responsivity, Photomultiplier tube.**Solar Cell:** Construction, working and characteristics,schematic circuit, **LCD Displays:** Types of liquid crystals, Principle of Liquid Crystal Displays, applications, advantages over LED displays.

UNIT-III:Fiber Optics Communication:

Principle, fiber optic cables, core and cladding, modes of fibers: single mode and multi-mode fibers, splices and connectors, transmitter, receiver, block diagram of optical fiber communication system and its working, losses in optical fibers, advantages and disadvantages of optical fiber communication

UNIT-IV: POWER ELECTRONICS: Power Devices:

Need for semiconductor power devices, Power MOSFET (Qualitative). Introduction to family of thyristors, Silicon Controlled Rectifier (SCR)- structure, I-V characteristics, Turn-On and Turn-Off characteristics, ratings, Gate-triggering circuits, Diac and Triac- Basic structure, working and V-I characteristics. Application of Diac asa triggering device for Triac.

Insulated Gate Bipolar Transistors (IGBT): Basic structure, I-V characteristics and switching characteristics

UNIT-V: POWER DEVICE APPLICATION:

Applications of SCR: Phase controlled rectification, AC voltage control using SCR andTriac as a switch. Power Invertors- Need for commutating circuits and their varioustypes, dc link invertors,

Parallel capacitor commutated invertors, Series Inverter,limitations and its improved versions, bridge invertors.

Reference Books:

- J. Wilson & J.F.B. Hawkes, Optoelectronics: An Introduction, Prentice Hall India (1996)
- S.O. Kasap, Optoelectronics & Photonics, Pearson Education (2009)
- AK Ghatak & K Thyagarajan, Introduction to fiber optics, Cambridge Univ. Press (1998)
- Power Electronics, P.C. Sen, Tata McGraw Hill
- Power Electronics, M.D. Singh & K.B. Khanchandani, Tata McGraw Hill
- Power Electronics Circuits, Devices & Applications, 3rd Edition, M.H. Rashid,
- Pearson Education
- Optoelectronic Devices and Systems, Gupta, 2nd Edition, PHI learning.

Practical- Generic Elective

Title: PHOTONIC AND POWER ELECTRONIC DEVICES LAB

Total Marks= 50 **Course code: UETTGE-602**
Internal Practical Examination= 25 **Credit: 02**
External Practical Examination= 25 **Duration=03 hrs**

Aims and Objectives of the Course

- To train the students to design and analyze various photo detectors in the lab.
- To give the detail knowledge of Optical fibers and their applicability in various fields.
- To impart knowledge about working of various power electronic devices.

List of Practical in semester- VI(Generic Elective)

Note: At least 06 experiments from the following:

1. To determine wavelength of sodium light using Michelson's Interferometer.
2. Diffraction experiments using a laser.
3. Study of Electro-optic Effect.
4. To determine characteristics of (a) LEDs, (b) Photo voltaic cell and (c) Photo diode.
5. To study the Characteristics of LDR and Photodiode with (i) Variable Illumination intensity, and (ii) Linear Displacement of source.
6. To measure the numerical aperture of an optical fiber.
7. Output and transfer characteristics of a power MOSFET.
8. Study of I-V characteristics of SCR
9. SCR as a half wave and full wave rectifiers with R and RL loads.
10. AC voltage controller using TRIAC with UJT triggering.
11. Study of I-V characteristics of DIAC.
12. Study of I-V characteristics of TRIAC.

Semester- VI
Skill Course

Title: C++ PROGRAMMING **Credits: 02**
Code: UETTS-60 **Total Marks: 50**
InternalExamination:10marks End Semester Examination: 40marks
Duration: 2hours

Aims and Objectives of the Course

- To impart theoretical knowledge about various C++ programming concepts like inheritance polymorphism, overloading, message passing etc.
- To give the detail knowledge of classes and their usage in C++
- To impart knowledge about structures, unions, nesting and other concepts in C++

Unit I Fundamentals of C++

Section-01
Object-Oriented Programming: Procedural Languages, Object-Oriented Approach; Characteristics of Object-Oriented Languages: Objects, Classes, Inheritance, Reusability, Creating New Data Types.

Section-02
Polymorphism and Overloading; Directives: Preprocessor Directives, Header Files; Data Types Comments, Integer Variables, Character Variables, Floating Point Types.

Section-03
Operators, Library Functions;Loops: for, nested for, while, do while; Decisions: if, if-else, nested if-else, switch; Control Statements: Break, Continue, Go to.

Section-04
Structures: Simple Structure,Definition, Defining a Structure Variable, Accessing Structure Members, Structures Within Structures.

Unit 2 Functions, Arrays and Classes in C++

Section-01

Functions: Declaration, Calling, Definition, Passing Arguments to Functions: Constants, Variables, Passing by Value, Passing by references.

Section-02

Structures as Arguments, Returning Values from Functions: return Statement, Returning Structure Variables; Reference Arguments: Passing Simple Data Types by Reference; Overloaded Functionsand their usage, Inline Functions.

Section-03

Array Fundamentals, One dimensional and multi dimensional arrays, syntax and flowcharts, Arrays as Class Member Data, Arrays of Objects, Standard C++ string Class: Defining and Assigning string Objects.

Section-04

Scope and Storage Class: Local, Global, and Static Local Variables, Storage; Simple Class: Classes and Objects, Defining the Class, Using the Class, Calling Member Functions; C++ Objects as Physical Objects,

Reference books

1. Object Oriented Programming and C++, Balaguruswamy, TMH.
2. Herbert Schildt, C++ The Complete Reference, McGraw Hill.
3. H.M. Deitel and P. J. Deitel, C++: How to program, Prentice Hall.
4. BjameStroustrup, The C++ Programming Language, (3rd edition), AddisionWeskey.
5. Robert Lafore, Object Oriented Programming in C++, Galgotia Publication.

Practical Semester VI
Skill Course

Title: C++ Programming Lab **Course code: UETTS-602**
Total Marks= 50 **Credit: 02**
Internal practical examination= 25 **External Practical Examination= 25**
Duration=03 hrs

Aims and Objectives of the Course

- To enable the students to gain the knowledge about important concepts of C++ and use them practically.
- To train the students to compile and run various C++ program on turbo C++ software.
- To impart practical knowledge about making flowchart, algorithm on various concepts like looping, inheritances, overloading, classes and many more.

List of Practical in semester- VISkill Course)

Note: At least 06 experiments from the following:

1. To find the largest of three numbers.
2. To make a program on multi level inheritance.
3. To make a program on function over loading
4. To generate a Fibonacci series.
5. To make a program on print of sum of digits.
6. To make a program on reverse of digits.
7. To make a program on multiplication of two matrix.
8. To make a program on transpose of a matrix
9. To make a program to convert decimal no to binary.