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

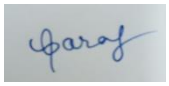
Lists of Contents

Acknowledgement

I take this opportunity to express my heartfelt gratitude to all the personalities to make the syllabus restructuring 2021 a success. I express profound gratitude to the worthy Principal, external and internal members, university nominee, for their sincere cooperation and guidance during the restructuring process.

I hereby place on record my whole hearted gratitude to Sh. D.S Oberoi, (Director Incharge NIELETE, J&K), Mrs. Manjit kaur, (Principal Engineer CDAC Mohali) and Dr. Gurmohan Singh (Principal Engineer, CDAC, Mohali) for their timely help and suggestions. My sincere thanks are also to Dr. Yadwinder Kumar, (Assistant Professor, Dept. of Electronics & Communication Engineering, YCOE, Punjabi University Regional Campus, Bathinda Punjab), Sh. Pawan Kohli, (CEO-Morris Garages), Prof. Ajay Abrol, (Asst. Prof. GCET, Jammu) .

I am also grateful to all the teachers from different colleges who despite their busy schedule participated in the Board of Studies (BOS) meeting for designing the syllabus. The novel ideas proposed during BOS meeting has been incorporated in the syllabus. I also take the opportunity to express my gratitude to all the academicians, professionals, stakeholders who gave valuable suggestions in this regard.



Vipul Saraf
Head, Department of Electronics
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Introduction

Govt. College for Women, Parade Ground Jammu, an autonomous College, has introduced the choice based credit system (CBCS) from the academic year 2016-17. But as per the UGC and the feedback from the stakeholders, the syllabus needs some modifications and addition to meet the requirements legally and technically. The syllabus is then modified and one of the draft is proposed by the board of studies of Electronics is hereby submitted for approval to the Academic Council and Governing body.

Aims and Objectives

A curriculum course content and assessment of scholastic achievement play complimentary role in shaping the education. The committee is of the view that members should report and encourage the broad instructional goals such as giving knowledge of the discipline of Electronics, theory and techniques, concepts and general principles. They should also support the ability to ask physical questions and to obtain the answers to physical questions by the use of quantitative and qualitative reasoning and by the experimental investigations. The important student friendly attributes including designing, creativity, curiosity and deep understanding levels of Electronics to other disciplines and to social issues should also be given encouragement.

With these things in mind, we aim to provide a firm foundation in every aspect of Electronics and to explain the broad spectrum of modern trends in Electronics.

The programme also aims to develop the following abilities:-

1. Read, understand and interpret physical information- verbal, mathematical and graphical.
2. Impart skills required to gather information from resources and use them.
3. Offer courses to the choice of the students.

4. Perform experimental analysis and interpret and compose the results of the observation.
5. Use of ICT tools at the undergraduate level.
6. Providing best facilities in the department to attract outstanding students from all background.

Objectives of the Programme

Following are the main objectives of the Programme:-

1. To provide deep knowledge of scientific and technological aspects of Electronics.
2. Update students with recent and technological developments.
3. Train the students by introducing skill based courses in Electronics.
4. Enrich students through programmes such as seminars, workshops, quizzes etc.
5. Train students to a level to compete for seats for advanced degrees such as masters and other related disciplines.

Duration of the Program

The duration of the undergraduate program is six semester. There shall be two semester in the academic year. The odd semester (Sem-I, III and V) commences from 15th of July, every year and the even semester (Sem-II, IV and VI) commences in the month of January, every year. Between both the types of semester, there is a break of one and a half month called 'summer vacation' which commences from Ist of June to the 15th of July, every academic year. The students may be permitted to complete the program on valid reason, within a period of six continuous semesters from the date of commencement of first semester of the program.

Evaluation of various components in the curriculum and marks distribution for internal and external evaluation

The final end semester examination shall be conducted by the college at the end of each semester. Internal evaluation is to be done by the internal assessment test taken one month before the start of final end semester examination and evaluation of attendance.

For all papers, internal and practical examination is to be taken before and after the start of final end semester examination. Thus the overall marks distribution for external and internal theory examination as well as practical examination is shown below.

1. For all theory papers except skill courses
   a. Marks of external examination= 80
   b. Marks of internal evaluation= 20

all the two components of internal assessments are mandatory

Component of internal evaluation of theory	Marks
Attendance	05
Assessment Test/ Assignment Test	15
Total	20

2. For all Practical Papers including skill courses
   a. Marks of external examination= 25
   b. Marks of internal evaluation= 25

Internal Practical Examination

All the three components of internal assessments are mandatory

Components of internal evaluation of Practical	Marks
Attendance	05
Test	08

Lab Involvement	12
Total	25

The practical file related to the number of examination performed must be duly signed by the teacher in charge and authenticated by the HOD Electronics. For appearing in the external practical examination, certified record should also be produced.

Guidelines for skill courses

Each Skill Course shall comprise of theory and practical components. These shall be referred as Skill Theory course and Skill Practical course.

Each course (Skill Theory and Skill Practical) shall of two credits.

Skill theory course

Guidelines for design of the course

1. Total credits = 2
2. Maximum marks 50(Internal 10, External 40)
3. The course content to be consolidated into two units of 4 subunits each

Evaluation strategy

A) Internal assessment

1. Internal assessment (10 Marks) as per the adopted procedure for other courses.
2. No marks have been earmarked for attendance, however the eligibility criterion for appearing in the end semester examination shall remain the same as is followed in other courses.

B) External end semester Examination

1. Maximum Marks =40.
2. Question paper shall have three (A, B and C)sections :-
    i) Section A shall comprise of 4 questions of 2 marks each.
    ii) 2 questions shall be set from each unit of the prescribed course content.
    iii) All questions shall be compulsory.

    i) Section B shall comprise of 4 questions of 5 marks each
    ii) 2 questions shall be set from each unit of the prescribed course content.

iii) All questions shall be compulsory.

i) Section C shall comprise of 3 questions of 12 marks each.
ii) 1.5 questions shall be set from each unit of the prescribed course content.
iii) Students shall be asked to attempt only one question of 12 marks from this section.

Skill Practical course

Guidelines for design:-

1. Total credits = 2
2. Maximum marks 50(Internal 25, External 25)
3. The course content (Practical/ projects/ field survey etc) shall be set as per the requirements of the course/ or as adopted in other practical courses.

Evaluation strategy

A) Internal assessment

1. Internal assessment (25 Marks) as per the adopted procedure for other courses.
2. 5 marks have been earmarked for attendance, and the eligibility criterion for appearing in the end semester examination shall remain the same as is followed in other courses.

B) External end semester Examination

Maximum Marks =25.

Procedure of the external examination shall be same as is followed in other practical courses.

External Practical Examination

For all the practical papers, there will be an external evaluation. The external examination will be appointed by the Principal of the college in consent with the HOD in charge. There will be an internal examiner who will be appointed by the head of the department. The examination will be of 03 hour duration and the various components for the evaluation of external examination is given below.

Components of external evaluation of Practical examination	Marks
Test	06
Practical Record File	06
Viva- voice	05
Experimentation/ Data collection	08
Total	25

3. Assignments

Assignments are to be done for all the semesters. Atleast one assignment should be done in each semester for all the theory courses.

4. Internal Assessment

One internal test paper is to be taken in each semester for each theory course. The evaluation of all the components is to be published and acknowledged by the candidates time to time. All the documents of internal assessments are to be kept in the custody of the convener of the internal assessment examination and shall be made available for verification as and when required. The responsibility of evaluating the internal assessment is vested on the teacher in charge.

5. Attendance Evaluation

For all the courses- Theory and Practical

Percentage of Attendance	Marks
>90%	05
85%-90%	04
80%-85%	03
75%-80%	02
<75%	Ineligible

Consolidated Scheme for all Semesters:

B.Sc. Electronics Programme

Semester	Course Code	Course Title	Course Category	Credits	Total Credits
01	UETTC-101	1. Com. skill 2. EVS 3. Math 4. Physics 5. Electronics**(UETTC-101)**	Common-I Common- II Core Core Core	02 02 06 04+02=06 04+02=06	22
02	UETTC-201	1. Com. skill 2. EVS 3. Math 4. Physics 5. Electronics **(UETTC-201)**	Common-I Common- II Core Core Core	02 02 06 04+02=06 04+02=06	22
03	UETTC-301	1. Math 2. Physics 3. Electronics **(UETTC-301)** 4. Skill Course of Student choice	Core Core Core Skill	06 06 06 04	22
04	UETTC-401	1. Math 2. Physics 3. Electronics **(UETTC-401)** 4. Skill Course of Student choice	Core Core Core Skill	06 06 06 04	22
05	UETTDSE-501	1. Math 2. Physics 3. Electronics **(UETTDSE-501)** 4. Skill Course of Student choice	Core Core DSE Skill	06 06 06 04	22
06	UETTDSE-601	1. Math 2. Physics 3. Electronics **(UETTDSE-601)** 4. Skill Course of Student choice	Core Core DSE Skill	06 06 06 04	22

Detailed syllabus of all semesters

Semester-I

Title: Circuits and Network Analysis **Total Marks: 100**
Course Code: UETTC-101 **Credits:04**
Internal Examination: 20marks
End Semester Examination: 80marks
Duration: 3hours

Network Analysis

Unit I

Basic circuit concept: Voltage and current sources, series and parallel elements, duality, voltage division and current division.

Circuit analysis: Kirchoff's current law (KCL), Kirchoff's voltage law (KVL), node analysis, mesh analysis, star- delta transformation.

Network Theorem: Superposition Theorem, Thevenin's theorem, Norton's theorem, reciprocity theorem, Millman's theorem, Maximum power transfer theorem, Application of theorems to simple networks.

AC Circuit analysis

Unit II

AC circuit analysis: sinusoidal voltage and current, definition of instantaneous, peak, peak to peak, root mean square and average values, voltage- current relationship in resistor, inductor and capacitor, phasor, complex impedance.

Resonance in series and parallel RLC circuits, frequency response of series and parallel RLC circuits, quality (Q) factor and bandwidth

Transient Analysis

Unit III

DC transient analysis: Transient analysis of RL, RC, and RLC circuits using differential equations.

Laplace transform, properties of Laplace transform and its analysis, solution of problems using Laplace transform and it's inverse. Solution of series RL, RC, RLC circuits using Laplace transform.

Two Port Networks

Unit IV

Introduction: Two port network parameters, open circuit impedance, short circuit admittance, transmission, inverse transmission, hybrid and inverse hybrid, interrelationship of different parameters.

Filters

Unit V

Fundamentals: Neper, decibel, symmetrical networks, properties, propagation and Z_0

Filter fundamentals: Pass and stop bands, behavior of characteristic impedance, constant K low pass and high pass filters, m- derived T and Pi sections filters, termination with m derived half sections, band pass and band elimination filters, filter design.

Practical Semester-I

Title: Network Analysis lab **Course code: UETTC-102**
Total Marks= 50 **Credit 02**
Internal Practical Examination= 25 **External Practical Examination= 25**
Duration=03 hrs

List of Practical in semester- I

1.Familiarization with:-

a. Resistances in series, parallel and series- parallel.

b. Capacitors and Inductors in series and parallel.

c. Multimeter-Checking of components.

2. To find the h- parameters of a circuit.

3. Verification of Kirchoff's laws.

4. Verification of Thevenin's theorem

5. Verification of Norton's theorem

6. Verification of Superposition theorem

7. Verification of Millman's theorem

8. Verification of Reciprocity theorem

9. Verification of Maximum Power Transfer theorem.

10. Designing of a Low Pass RC Filter and study of its frequency response.

11. Designing of a High Pass RC Filter and study of its frequency response.

12. 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

13. To use network theorems on series and parallel RLC circuits.

Books Recommended

1. Robert L. Boylstead- Essentials of circuit analysis, Pearson Education (2004)
2. Circuits and Networks by A. Sudhakar, Shyammohan.
3. Circuit Theory and Networks by Bagchi Surajit.
4. Circuit Theory and Network Theory by Karna Satish K.
5. Electrical Circuit Theory and Technology by John Bird.

Semester- II

Title: Analog Electronics Course Code: UETTC-201
TotalMarks:100Credits: 04
Internal Examination: 20marksEnd Semester Examination: 80marks
Duration: 3hours

Basic Electronics

Unit I

Resistors- fixed and variable resistors, construction and characteristics, color coding of resistors, resistors in series and parallel.

Inductors- fixed and variable inductors, self and mutual inductance, energy stored in inductors, inductors in series and parallel.

Capacitors- fixed and variable capacitors, principles of capacitance, parallel plate capacitor, permittivity, definition of dielectric constant, dielectric strength, energy stored in capacitor, capacitor in series and parallel.

Semiconductor Diode

Unit II

PN Junction diode, static and dynamic resistances, equivalent circuits, transition and diffusion capacitances, diode load line analysis, diode equation and the I-V characteristics, Zener and avalanche mechanisms, Zener diode and its applications, construction, working and characteristics of LED, Solar cell, Photo, Tunnel, varactor diode and schottky diode

Transistor Biasing

Unit III

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, Unijunction transistors(UJT): Construction, working ans I-V characteristics of UJT, Phototransistors

FETs and MOSFET's

Unit IV

Field Effect Transistor (FET): construction of JFET, idea of channel formation, Pinch-off voltage, transfers and output characteristics

MOSFET: MOS diode, basic construction of MOSFET and working, I-V characteristics, enhancement and depletion modes, complimentary MOS (CMOS)

Amplifiers

Unit V

CE amplifier: self bias arrangement of CE, dc and ac load line analysis, hybrid equivalent of CE, Quantitative study of the frequency response of the CE amplifier, effect on gain and the bandwidth for cascaded CE amplifier (RC coupled) RC coupling, direct coupling, Transformer coupling and their frequency comparison

Power Amplifiers: Heat sink, classification of power amplifiers, A, B, C, AB, analysis of class B push pull amplifier

Practical Semester- II

Title: Analog Electronics Lab **Credit 02**
Total Marks= 50 **Course code: UETTC-202**
Internal Practical Examination= 25 **External Practical Examination= 25**
Duration=03 hrs

List of Practical in semester- II

1. To study the I-V characteristics of diode-conventional and Zener diode.
2. To study the I-V characteristics of BJT in CB configuration
3. To study the I-V characteristics of BJT in CE configuration
4. To study the I-V characteristics of BJT in CC configuration
5. To study the I-V characteristics of common source FET configuration
6. To study the I-V characteristics of common drain FET configuration
7. To study the I-V characteristics of common gate FET configuration
8. Study of fixed bias arrangement for transistor
9. To study the Zener diode as voltage regulator
10. To study I/O waveforms of half wave/ Full wave
11. To study the ripple factor of half wave/ Full wave
12. To study diode as shunt clipping element
13. To study diode as clamping element

Books Recommended:

1. Basic electronics and linear circuits by N.N Bhargava
2. Integrated electronics by Millman Halkias
3. S.M.Sze, Physics and technology of semiconductor devices
4. Robert Boylstead, Electronic devices and circuit theory

Semester-III

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

Oscilloscopes

Unit I

CRO: Block diagram and basic operation, CRT, Electrostatic focusing and deflection, CRT screen, CRT circuits, vertical deflection systems, horizontal deflection systems, delay line, oscilloscope probes, oscilloscope techniques, measurement of frequency, phase angle and time delay, types of CRO: Dual trace , digital storage oscilloscopes.

Transducers

Unit II

Classification of transducers: Capacitive and inductive, oscillation, LVDT, strain gauge, Piezo-electric, photoelectric, potentiometer, velocity, resistance thermometers: thermocouple and thermistors, Photosensitive devices: Photoconductive and Photovoltaic Cells.

Basic Operational Amplifiers

Unit III

Concept of differential operational amplifiers and block diagram of an OP-AMP (**741-IC**)

OP-AMP Parameters: input offset voltage, input offset current , input bias current, differential input resistance, input capacitance, offset voltage adjustment range, input voltage range, CMRR, slew rate, SVRR.

OP-AMP in open and close loop configuration, inverting, Non inverting, summing and difference amplifier, integrator, differentiator, V-I, I-V converter

Comparators and Signal Generators

Unit IV

Basic comparators, Level detector, voltage limiters, phase shift oscillator, wein- bridge oscillator, Schmitt trigger, square wave generator, triangular wave generator,

Multivibrators (IC-555)

Unit V

555: Block diagram, a stable, Monostable and Bistable, V-F, F-V (VCO) converters, introduction and applications of PLL.

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

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.

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. Operational Amplifier: RamakantGayakwad, Linear Integrated Circuits: D. Roy Chowdhary&SahilB.Jain.

Semester- III Skill Course

Title: Electronics Workshop **Code: UETTS-301**
Credits:04 **Total Marks: 100**
Internal Examination: 10marks
End Semester Examination: 40marks **Duration: 2hours**

Unit I: Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law.Series, parallel, and series-parallel combinations.AC and DC Electricity.Familiarizationwith multimeter, voltmeter and ammeter.

Unit II: Electrical Circuits: Basic electric circuit elements and their combination. Rules toanalyze DC sourced electrical circuits. Current and voltage drop across the DC circuitelements. Single-phase and three-phase alternating current sources, Rules to analyze ACsourced electrical circuits. Real, imaginary and complex power components of ACsource.Power factor. Saving energy and money.

Unit III: Electrical Drawing and Symbols: Drawing symbols. Blueprints, Reading Schematics.Ladder diagrams. Electrical Schematics.Power circuits. Control circuits. Reading ofcircuit schematics. Tracking the connections of elements and identify current flow andvoltage drop. DC Power sources.AC/DC generators.Inductance,capacitance, and impedance.Operation of transformers. Single-phase, three-phase & DC motors. Basic design.Interfacing DCor AC sources to control heaters & motors. Speed & power of ac motor.

Unit IV: Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers.Components in Series or in shunt. Response of inductors and capacitors with DC or ACsources,Relays. Fuses and disconnect switches. Circuit breakers.Overload devices. Ground-fault protection.Grounding and isolating. Phase reversal.Surge protection. Relay protection device.

Unit V: Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star anddelta connection.Voltage drop and losses across cables and conductors.Instruments tomeasure current, voltage, power in DC and AC circuits.Insulation.Solid and strandedcable.Conduit.Cable trays. Splices: wirenuts, crimps, terminal blocks, and solder.Preparation of extension board.

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.

Practicals Semester III Skill Course

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

List of Practical in semester-III Skill Course

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**

Unit I Number System and Codes

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

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

Digital Logic Family: Fan in, Fan out, Noise Margin, Power dissipation, current and voltage parameters in RTL, DTL, TTL, MOS and CMOS.

Unit IICombinational Logic Analysis and Design

Standard representation of Logic functions (SOP and POS), Karnaugh map minimization (up to 4 variables), Quine McCluskey minimization, Multiplexers (2:1, 4:1), Demultiplexers (1:2, 1:4), implementing logic functions with multiplexers, adders and subtractors (half and full), Encoders and Decoders

Unit IIISequential Logic

Latches, Flip Flops: SR, D, JK, Master Slave, T Flip Flops, clocked FF, Counters (Ripples, Synchronous and Asynchronous, Up-Down, Ring, Modulo-n,), state table.

Unit IVMemories

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

Unit VAD and DA Converters

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= 25 **External Practical Examination= 25**
Duration=03 hrs

List of Practical in semester- IV

1. To verify and design AND, OR, NOT, and EX-or using NAND/ NOR gates.
2. To convert a Boolean expression into a logic gate circuit and assemble using logic gate IC's.
3. Design a Half Adder and Full Adder.
4. Design a Half Subtractor and Full Subtractor.
5. Design 4:1 Multiplexers using Logic gates.
6. Design a DA and AD converters of given specifications.
7. Design a 4 bit counter using D/T/JK FF.
8. To realize NAND/NOR/NOT using Transistor/MOS IC.

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

Semester- IV Skill Course

Title:Power Electronics **Course Code: UETTS-401**

Credits:02 Total Marks:100

Internal Examination: 20marks **End Semester Examination: 40marks**

Duration: 2 hours

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:04 **Total Marks: 50**
Internal Examination: 10 marks **End Semester Examination: 40 marks**
Duration: 2 hours

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 Elective Course

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

Unit I: Waves and Antennas:

Frequency spectrum; propagation of waves; free space, troposphere, and ionosphere propagation; 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, antenna efficiency, gain, input impedance and polarization, types of antenna, Hertizian dipole, grounded and ungrounded 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.

Unit III: Amplitude Modulation and demodulation:

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

Amplitude Modulation; representation and frequency spectrum, 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; 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; Phase Modulation (PM), modulation index, effects of noise and noise triangle; 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, Pulse Code Modulation.

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

Practical Semester V

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

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 Time Division Multiplexing (TDM)
6. To study Pulse Amplitude Modulation (PAM)
7. To study Pulse Width Modulation (PWM)
8. To study Pulse Position Modulation (PPM)
9. To study Phase Modulation (PM).

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
- Electronic Communication system, Blake, Cengage.
- 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

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, 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).
- S. Rangan, G. R. Sarma and V. S. Mani, Instrumentation Devices and Systems, Tata Mcgraw Hill.
- Introduction to measurements and instrumentation, Ghosh, PHI Learning

Practical- Generic Elective

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

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.

Semester- V Skill Course

Title:Antenna theory and wireless networks

Credits: 02 **Code: UETTS-501**

Total Marks: 100

InternalExamination:10marks **End Semester Examination: 40 marks**

Duration: 2hours

60Lectures

UNIT-I: ANTENNA THEORY:

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. 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.

UNIT-II: Antenna as a Transmitter/Receiver:

Effective Height and Aperture, Power delivered to antenna, Input impedance. Radiation from an infinitesimal small current element, Radiation from an elementary dipole (Hertizian dipole), Reactive, Induction and Radiation fields, Power density and radiation resistance for small current element and half wave dipole antenna. Radiating wire Structures (Qualitative idea only):Monopole, Dipole, Folded dipole, Loop antenna and Biconical broadband Antenna. Basics of Patch Antenna and its design. Examples of Patch antenna like bowtie, sectoral, fractal, etc.

UNIT-III: Propagation of Radio Waves:

Different modes of propagation: Ground waves, Space waves, Space Wave propagation over flat and curved earth, Optical and Radio Horizons, Surface Waves and Troposphere waves, Ionosphere, Wave propagation in the Ionosphere, Critical Frequency, Maximum usable frequency (MUF), Skip distance, Virtual height, Radio noise of terrestrial and extraterrestrial origin, Elementary idea of propagation of waves used in Terrestrial mobile communications.

UNIT-IV: WIRELESS NETWORKS:

History of wireless communication, Wireless Generation and Standards, Cellular and Wireless Systems, Current Wireless Systems, Cellular Telephone Systems, Wide Area Wireless Data Services, Broadband Wireless Access, Satellite Networks, Examples of Wireless Communication Systems. Idea about Global Mobile communication system.

UNIT-V: Modern Wireless Communication Systems:

Second Generation (2G) Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL), Wireless Local Area Networks (WLANs), Bluetooth and Personal Area Networks (PANs). Idea about Wi-Fi, 4G and LTE, and 5G

Reference Books:

- Ballanis, Antenna Theory, John Wiley & Sons.
- Jordan and Balmain, E. C., Electro Magnetic Waves and Radiating Systems, PHI.
- Andrea Goldsmith, Wirelerss communications, (2015) Cambridge University Press
- D. Tse and P. Viswanathan, Fundamentals of Wireless Communication, Cambridge University Press.
- Wireless communication and Networks, Upena Dala, 2015, Oxford University Press.
- Antenna and Wave Propagation, Yadava, PHI Learning.
- Haykin S. & Moher M., Modern Wireless Communication, Pearson.
- Lee, William C.Y Mobile Communication Design and Fundamentals.

Semester- VI

Discipline Specific Elective

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

Unit – I: 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, 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.

PracticalSemester VI

Discipline Specific Elective

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

List of Practical in semester- VI

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

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

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, **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.
- Electronic Devices and Circuits, David A. Bell, 2015, Oxford University Press.

Practical Semester VI

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**

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-601 **Total Marks: 100**
InternalExamination:10marksEnd Semester Examination: 40marks
Duration: 2hours

Unit I: Object-Oriented Programming: Procedural Languages, Object-Oriented Approach; Characteristics of Object-Oriented Languages: Objects, Classes, Inheritance, Reusability, Creating New Data Types, Polymorphism and Overloading; Directives: Preprocessor Directives, Header Files; Data Types Comments, Integer Variables, Character Variables, Floating Point Types, Operators, Library Functions;Loops: for, nested for, while, do while; Decisions: if, if-else, nested if-else, switch; Control Statements: Break, Continue, Go to.

Unit II: Structures: Simple Structure,Definition, Defining a Structure Variable, Accessing Structure Members, Structures Within Structures.Functions: Declaration, Calling, Definition, Passing Arguments to Functions: Constants, Variables, Passing by Value, Structures as Arguments, Returning Values from Functions: return Statement, Returning Structure Variables; Reference Arguments: Passing Simple Data Types by Reference; Overloaded Functions, Recursion, Inline Functions.

Unit III: 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, C++ Objects as Data Types, Constructors, Destructors, Objects as Function Arguments.

Unit IV: Array Fundamentals, Arrays as Class Member Data, Arrays of Objects, Standard C++ string Class: Defining and Assigning string Objects, Input/Output with string Objects, Finding, Modifying, and Comparing string Objects, Overloading Unary Operators, Overloading Binary Operators, Data Conversion.

Unit V: Inheritance: Derived Class and Base Class, Derived Class Constructors, Overriding Member Functions, Public and Private Inheritance, Levels of Inheritance, Multiple Inheritance, Ambiguity in Multiple Inheritance; Pointers: Pointer Variables, Syntax Quibbles, Pointer to void, Pointers and Arrays, Pointers and Functions, Memory Management, Pointers to Objects, Linked List, Pointers to Pointers.

Reference books

1. Robert Lafore, Object Oriented Programming in C++, Galgotia Publication.
2. Object Oriented Programming and C++, Balaguruswamy, TMH.

3. Herbert Schildt, C++ The Complete Reference, McGraw Hill.
4. H.M. Deitel and P. J. Deitel, C++: How to program, Prentice Hall.
5. BjameStroustrup, The C++ Programming Language, (3rd edition), AddisionWeskey.

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 01

Pawan Kohli

Chief Commercial Officer (COO)

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Tel. +91-191-2554208

Dear Prof Vipul Saraf ,

Greetings !!!
Hope you and your family are fine and doing well and I wish Almighty to keep you all safe from all evils .
Kindly refer to the attached Syllabus . Have gone through the same and found it absolutely appropriate . I feel the implementation of this course will prepare the students with fundamental foundation in the subject matter and encourage them for facing the real-life professional challenges in the field of Electronics and enable them to make a successful career in the years to come .

However , having spent a sizeable number of years in Automotive industry I would highly recommend introducing the Study of Electric Vehicles to students as there is a massive scope of growth in this industry in next 5 decades . The preparation of our students will leverage them to explore highly paid careers in this industry .

Thank you so much for giving me the opportunity to review the syllabus and I take it as an honour to me.

Looking forward to serving you in the future as well .

Warm regards

PAWAN KOHLI

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 02

Gurmohan Singh

Principal Engineer,
Cyber Security Technology Division(CSTD)
Centre for Development of Advanced Computing (C-DAC),
[Ministry of Electronics & Information Technology (MeitY), Govt. of India)]
A-34, Phase-8, Industrial Area, Mohali.
PHONE-919417483045(M)
Date: Mon, Apr 29, 2020, 2:23 PM
Sender- gurmohan@cdac.in
Recipient-vipsaraf@gmail.com

Dear Vipul,

Please find attached few additions in subject Analog Electronics Course Code: UETTC-201. The additions are highlighted in red color. I have also recommended a standard textbook at Sr. No. 06. The sole purpose of these additions is to aware the students about MOSFET as it is most widely used component in electronic industry.

The rest of syllabus is very well drafted.

Thanks and Regards

Dr. Gurmohan Singh

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 03

Dr. Vishal Sharma
Assistant Professor & Head,
Department of Electronics
Govt. M A M College Jammu
Date: Aug 7, 2021, 11:35 AM
Sender- vishal.jmu@gmail.com
Recipient- vipsaraf@gmail.com

Dear Prof. Vipul Saraf,

I hope you are safe.

Thank you very much for sending me the syllabus for suggestions/recommendations.

I have checked the syllabus and it is well drafted. I found it appropriate for graduate students.

I do not think there is any need for the modification.

So I recommend the same.

Kind Regards
Dr. Vishal Sharma

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 04

Shivani Dogra

Lecturer
MAM College, Jammu
Date: Thu, July 29, 2021, 8:04 PM
Sender- sdogra76@rediffmail.com
Recipient- vipsaraf@gmail.com

Respected Sir,

I m fine and hope you are also fine at your place. In context of this syllabus,I want to state that after studying the syllabus of all semesters, I think that the syllabus of all semesters fulfills the specific purpose. It contains all essential components that is necessary to learn for graduate students. In my opinion,there is no need for any modification.

Thanks and Regards

Shivani Dogra

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 05

Meena Gupta

Assistant Professor
Department of Electronics
G.G.M.Science College
Jammu
Date: Tue, July 28, 2021, 1:02 PM
Sender- gupta.meena13@gmail.com
Recipient- vipsaraf@gmail.com

Respected Sir,

I have gone through the syllabus. only few changes are made and they are marked with red ink. The copy of syllabus is hereby attached.

Thanks and regards.

Meena Gupta

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 06

Dr. Yadwinder Kumar

Asst Professor ECE,
YCOE, TS, RC Punjabi University.
Date: Tue, Aug 1, 2021, 8:25 AM
Sender- yaddi79@gmail.com
Recipient-vipsaraf@gmail.com

Dear Prof. Vipul Saraf (Head ECE Dept),

I have included suggestions in the form of 'Text Boxes' in the various pages (wherever required) of the syllabus shared by you.

Thanks and Regards.

Dr. Yadwinder Kumar.

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 07

Ajay Abrol

Assistant Professor
GCET. Jammu
Date: Tue, August 8, 2021, 12:28 PM
Sender-ajayabrol17569@rediffmail.com
Recipient- vipsaraf@gmail.com

Dear Vipul

I have gone through the syllabus and marked red at some places. We will discuss on phone as well.

Regards

Ajay Abrol

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 08

Dr. Rakesh Vaid,

FIETE, SMIEEE, MECS, LMIAPT
Professor and Head
Department of Electronics,
University of Jammu,
Jammu-180006,(J&K) INDIA

Sender- rakeshvaid@ieee.org
Date: Tue, July 28, 2021, 12:57 PM
Recipient- vipsaraf@gmail.com

Dear Vipul ji

I have gone through the course contents of the syllabus you have sent me. I am of the opinion that you should add aims and objectives for each course and also the outcomes. Moreover please go though the copy of our syllabus of M. Sc. for that purpose. It will help you to finalize your draft. Kindly make sure to have the compatibility with the syllabus of the University of Jammu as well the syllabus of the cluster University.

With Warm Regards,

Dr Rakesh Vaid

Suggestions/Feedback/Comments obtained by the Members of Board of Studies, Electronics

Member- 08

Dr. D S Oberoi

In charge Director
NIELIT
Jammu-180006,(J&K) INDIA
Date: Aug 4 , 2021, 11.18 AM
Email id :oberoi@nielit.gov.in

Dear Vipul ji

I have gone through the course contents of the syllabus you have sent me. This is fine

With Warm Regards,

Dr. D S Oberoi

Result of the BOS, Electronics Meet- 2021-2022

Due to corona pandemic, the whole country is under the lockdown and it is not possible for me to arrange the board of studies meet in the department of Electronics in the college premises. So, in this connection, I have sent a soft copy of the draft of the syllabus to each member of the board of studies, Electronics for their necessary suggestions/ feedback/ comments. These suggestions/ feedback/ comments are further incorporated in the syllabus for making of the final draft of the syllabus which is to be presented before the Academic Council and Governing body for the final approval. The necessary feedback reports from the various members are also enclosed here with for your kind reference and it is represented in the form of a table as given below:-

S.no.	Name of the BOS Member	Suggestion/Feedback/Comments	Response by the faculty of the Department of Electronics
01.	**Sh. Pawan Kohli** Chief Commercial Officer (COO) **SAPCON STEELS PRIVATE LIMITED** M. +91-8899009139 & +91-7771010176 E. pawan@sapconsteels.com www.sapconsteels.com Tel. +91-191-2554208	It will be very significant to incorporate some kind of basic information about Electrical Vehicles and Power electronics for these graduate level students so that they can develop the interest in Automotive Electronics at the fundamental level and prepare their minds to move in the direction of making their extended research on the subject by joining niche institutions or universities to pursue further.	Your Suggestion/Feedback is highly appreciated but it is practically not possible to include the course of Electrical Vehicles at the graduate level due to the complexity of the course and lack of related infrastructure in the laboratory but we have incorporated Power Electronics as the skill course.
02.	**Dr. Gurmohan Singh** Principal Engineer, Cyber Security Technology Division(CSTD), (C-DAC), [Ministry of Electronics & Information Technology (MeitY), Govt. of India)] A-34, Phase-8, Industrial Area, Mohali.	Please find attached few additions in subject Analog Electronics Course Code: UETTC-201. The additions are highlighted in red color. I have also recommended a standard textbook at Sr. No. 06. The sole purpose of these additions is to aware the students about MOSFET as it is most widely used component in electronic industry. The rest of syllabus is very well drafted.	The suggestions given by your good self is highly welcomed and appreciated as well. The changes offered by you are now incorporated in the syllabus
03.	**Dr. Vishal Sharma** Assistant Professor & Head, Dept. of Electronics G. M.A.M College, Jammu	In my view the syllabus which you have framed seems to be well formulated and drafted and there is no need of any modification, So I recommend the same.	The response given by your good self is highly appreciated. Thank you for all the concern.

		.So I recommend the same.	
04.	**Ms. Shivani Dogra** Lecturer Dept. of Electronics G.G.M.Science College Jammu	After studying the draft of the syllabus, I want to state that the whole of the syllabus fulfills the specific purpose and possess essential components that is necessary to learn for graduate students. In my opinion, there is no need for any modifications.	The suggestions/ feedback given by your good self are highly appreciated. Thank you for your kind attention and concern.
05.	**Prof. Meena Gupta** Asst. Professor Department of Electronics G.G.M.Science College Jammu	I have gone through the syllabus. Only few changes are made and they are marked with red ink. The copy of syllabus is hereby attached.	The changes suggested by your good self is highly welcomed and are now incorporated in the syllabus.
06.	**Dr. Yadwinder Kumar** Asst Professor ECE, YCOE, TS, RC Punjabi University.	Kindly find the attached suggest sheet from my side	We have found your suggestion sheet and the valuable suggestions are highly appreciated and are incorporated in the syllabus.
07.	**Sh. Ajay Abrol** Assistant Professor GCET. Jammu	I have gone through and marked red at some places.	We highly appreciate your concern and the valuable suggestions are being used in drafting the final syllabus.
08.	**Dr. Rakesh Vaid** Professor and Head Dept. Of Electronics University of Jammu Jammu.	. I am of the opinion that you should add aims and objectives for each course and also the outcomes.Moreover You should go though the copy of our SYLLABUS of M. Sc. for that purpose. It will help you to finalize your draft. Kindly make sure to have the compatibility with the SYLLABUS of the University of Jammu as well the SYLLABUS of the cluster University.	Sir, we have found the copy of your syllabus and after making some changes and further addition, we assure your good self that now our syllabus is well compatible with the higher course level.
09.	**Dr. D S Oberoi** In charge Director NIELIT Jammu	I have gone through the syllabus and found the same as **most appropriate** for your students.	The suggestions/ feedback given by your good self are highly appreciated. Thank you for your kind attention and concern.

Thefinal Draft of the Syllabus, B. Sc Electronics, Semester-I, II, III, IV, V&VI

Semester-I

Title: Circuits and Network AnalysisTotal Marks: 100
Course Code: UETTC-101 Credits: 04
Internal Examination: 20marksEnd Semester Examination: 80marks
Duration: 3hours

Aim and Objective of Course

- To provide deep knowledge of analog circuits, their parameters and the various methods used to solve the circuits in different conditions.
- To allow the students to learn various network theorems and applying them on complex circuits.
- To provide the knowledge of Steady state and Transient response of RLC circuit.
- To teach the basic concepts of filters their types and usage in analog circuits.

Network Analysis

Unit I

Basic circuit concept: Voltage and current sources, series and parallel elements, duality, voltage division and current division.

Circuit analysis: Kirchhoff's current law (KCL), Kirchhoff's voltage law (KVL), node analysis, mesh analysis, star- delta transformation.

Network Theorem: Superposition Theorem, Thevenin's theorem, Norton's theorem, reciprocity theorem, Millman's theorem, Maximum power transfer theorem, Application of theorems to simple networks. Numerical Problems(15% of the marks will be given to numerical).

AC Circuit analysis

Unit II

AC circuit analysis: sinusoidal voltage and current, definition of instantaneous, peak, peak to peak, root mean square and average values, voltage- current relationship in resistor, inductor and capacitor, phasor, complex impedance.

Resonance in series and parallel RLC circuits, frequency response of series and parallel RLC circuits, quality (Q) factor and bandwidth

Transient Analysis

Unit III

DC transient analysis: Transient analysis of RL, RC, and RLC circuits using differential equations.

Laplace transform, properties of Laplace transform and its analysis, solution of problems using Laplace transform and it's inverse. Solution of series RL, RC, RLC circuits using Laplace transform.

Two Port Networks

Unit IV

Introduction: Two port network parameters, open circuit impedance, short circuit admittance, transmission, inverse transmission, hybrid and inverse hybrid, interrelationship of different parameters.

Filters

Unit V

Fundamentals: Neper, decibel, symmetrical networks, properties, propagation and Z_0

Filter fundamentals: Pass and stop bands, behavior of characteristic impedance, constant K low pass and high pass filters, m- derived T and Pi sections filters, termination with m derived half sections, band pass and band elimination filters, filter design.

Practical Semester I

Title: Network Analysis Lab **Course code: UETTC-102**
Total Marks= 50 **Credit 02**
Internal practical examination= 25 **External practical examination= 25**
Duration=03 hrs

Aims and Objectives of the Course

- To provide the practical knowledge of analog circuits and various operations on them.
- To train the students practically to solve the networks using various theorems.
- To provide the practical know how of h- parameters and their usage.

List of Practical in semester- I

1.Familiarization with:-

a. Resistances in series, parallel and series- parallel.

b. Capacitors and Inductors in series and parallel.

c. Multimeter-Checking of components.

2. To find the h- parameters of a circuit.

3. Verification of Kirchoff's laws.

4. Verification of Thevenin's theorem

5. Verification of Norton's theorem

6. Verification of Superposition theorem

7. Verification of Millman's theorem

8. Verification of Reciprocity theorem

9. Verification of Maximum Power Transfer theorem.

10. Designing of a Low Pass RC Filter and study of its frequency response.

11. Designing of a High Pass RC Filter and study of its frequency response.

12. 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

13. To use network theorems on series and parallel RLC circuits.

Books Recommended

1. Robert L. Boylstead- Essentials of circuit analysis, Pearson Education (2004)
2. Circuits and Networks by A. Sudhakar, Shyammohan.

3. Circuit Theory and Networks by Bagchi Surajit.
4. Circuit Theory and Network Theory by Karna Satish K.
5. Electrical Circuit Theory and Technology by John Bird.
6. Network Analysis and Synthesis by S.P. Ghosh & A.K. Chakraborty

Semester- II

Title: Analog ElectronicsCourse Code: UETTC-201
Total Marks:100Credits: 04
Internal Examination: 20marks End Semester Examination: 80marks
Duration: 3hours

Aims and Objectives of the Course

- To impart the knowledge of semiconductor diodes, their importance in the field of material science and their various types.
- To give the detail knowledge of Resistors, Capacitors and Inductors, their composition and usage.
- To provide the knowledge of various types of Transistors, their biasing technique and usage as an important amplifying tool.

Basic Electronics

Unit I

Resistors- fixed and variable resistors, construction and characteristics, color coding of resistors, resistors in series and parallel.

Inductors- fixed and variable inductors, self and mutual inductance, energy stored in inductors, inductors in series and parallel.

Capacitors- fixed and variable capacitors, principles of capacitance, parallel plate capacitor, permittivity, definition of dielectric constant, dielectric strength, energy stored in capacitor, capacitor in series and parallel.

Semiconductor Diode

Unit II

PN Junction diode, static and dynamic resistances, equivalent circuits, transition and diffusion capacitances, diode load line analysis, diode equation and the I-V characteristics, rectifiers- Full wave, half wave and bridge type- determination of efficiency and ripple.Zener and avalanche mechanisms, Zener diode and its applications, construction, working and characteristics of LED, Solar cell, Photo diodes,PIN diodes, Tunnel, varactor diode and schottky diode

Transistor Biasing

Unit III

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,Numerical Problems, Unijunction transistors (UJT): Construction, working and I-V characteristics of UJT, UJT as relaxation oscillator, Phototransistors

FETs and MOSFET's

Unit IV

Field Effect Transistor (FET): construction of JFET, idea of channel formation, Pinch-off voltage, transfers and output characteristics

MOSFET: MOS diode, basic construction of MOSFET and working, I-V characteristics, enhancement and depletion modes, complimentary MOS (CMOS). Channel Length Modulation and Body effect in MOS transistors. Introduction to MOS amplifier configurations (Common-Source and Common- drain) and their working principles.

Amplifiers

Unit V

CE amplifier: self bias arrangement of CE, dc and ac load line analysis, hybrid equivalent of CE, Quantitative study of the frequency response of the CE amplifier, effect on gain and the bandwidth for cascaded CE amplifier (RC coupled) RC coupling, direct coupling, Transformer coupling and their frequency comparison

Power Amplifiers: Heat sink for power transistors, classification of power amplifiers, Class A, B, C, AB amplifiers, class A large signal amplifier, transformer coupled amplifiers, efficiency of amplifiers, push pull amplifiers, analysis of class B push pull amplifier.

Oscillators: Condition for sustained oscillations, RC phase shift, Hartley, Colpitt's, Crystal and Wien Bridge Oscillators.

Practical Semester II

Title: Analog Electronics Lab **Credit:02**
Total Marks= 50 **Course code: UETTC-202**
Internal Practical Examination= 25External Practical Examination= 25
Duration=03 hrs

Aims and Objectives of the course

- To train the students to bias semiconductor diodes in different modes.
- To practically allow the students to use the transistor in various configurations.
- To provide the practical knowledge of applications of semiconductor devices and giving the detail analysis on them.

List of Practical in semester- II

1. To study the I-V characteristics of diode-conventional and Zener diode.
2. To study the I-V characteristics of BJT in CB configuration
3. To study the I-V characteristics of BJT in CE configuration
4. To study the I-V characteristics of BJT in CC configuration
5. To study the I-V characteristics of common source FET configuration
6. To study the I-V characteristics of common drain FET configuration
7. To study the I-V characteristics of common gate FET configuration
8. Study of fixed bias arrangement for transistor
9. To study the Zener diode as voltage regulator
10. To study I/O waveforms of half wave/ Full wave
11. To study the ripple factor of half wave/ Full wave
12. To study diode as shunt clipping element
13. To study diode as clamping element
14. To study UJT as relaxation oscillator

Books Recommended:

1. Basic electronics and linear circuits by N.N Bhargava
2. Integrated electronics by Millman Halkias
3. S.M.Sze, Physics and technology of semiconductor devices
4. Robert Boylstead, Electronic devices and circuit theory
5. S.K Gandhi, Study of Semiconductor Devices
6. J.B. Gupta, Electronic Devices and Circuit Theory
7. Microelectronic Circuits by Adel Sedra and Kenneth C. Smith

Semester-III

Title: Linear Integrated CircuitsTotal 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 LabCourse code: UETTC-302
Total Marks= 50 Credit: 02
Internal practical examination= 25External 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

8. To study half wave rectifier---with and without shunt capacitance filter.
9. To study centre tapped full wave rectifier---with and without shunt capacitance filter.
10. To study Zener diode as voltage regulator---load regulation.
11. Design , fabrication and testing of a 9v power supply with Zener regulator
12. Designing of a CE based amplifier of a given gain.
13. Design and study of Transistor biasing techniques.
14. 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= 25 External 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

15. To verify and design AND, OR, NOT, and EX-or using NAND/ NOR gates.
16. To convert a Boolean expression into a logic gate circuit and assemble using logic gate IC's.
17. Design a Half Adder and Full Adder.
18. Design a Half Subtractor and Full Subtractor.
19. Design 4:1 Multiplexers using Logic gates.
20. Design a DA and AD converters of given specifications.
21. Design a 4 bit counter using D/T/JK FF.
22. To realize NAND/NOR/NOT using Transistor/MOS IC.
23. To implement De Morgan's theorem
24. 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

e) Power Devices: Need for semiconductor power devices, Power diodes, Enhancement of reverse blocking capacity, Introduction to family of thyristors.

f) 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.

g) 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.

h) 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

e) 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,

f) Series Invertor, limitations and its improved versions, bridge invertors.

g) 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

h) 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 ELECTRONICSTotal Marks: 100
Course Code: UETTDSE-501 Credits: 04
Internal Examination: 20marksEnd 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.