RANI CHANNAMMA UNIVERSITY
BELAGAVI

THE COURSE STRUCTURE & SYLLABUS OF UNDER GRADUATE

BACHELOR OF SCIENCE

ELECTRONICS

1ST TO 6TH Semesters

w.e.f.

Academic Year 2020-21 and Onwards
Under

CHOICE BASED CREDIT SYSTEM (CBCS)

CHOICE BASED CREDIT SYSTEM [CBCS]
B.Sc. Program with Optional Subject: ELECTRONICS

B.Sc., ELECTRONICS Syllabus under CBCS scheme (With effect from the academic year 2020-21 onwards)								
Sem	Part	Paper Code	Title of the Paper	Hours/ Week	Marks			Subject Credits
					IA	Exam	Total	
I	Part – 1 DSC	ELEDSCT1.1	Network Analysis And Analog Electronics	4	20	80	100	3
		ELEDSC P1.1	Practical I	3	10	40	50	1
		Total : Hours / Credits		7			150	4
II	Part – 1 DSC	ELEDSCT2.1	Electronic Circuits And Special Purpose Devices	4	20	80	100	3
		ELEDSC P2.1	Practical II	3	10	40	50	1
		Total : Hours / Credits		7			150	4

B.Sc., ELECTRONICS Syllabus under CBCS scheme (With effect from the academic year 2021-22 onwards)								
Sem	Part	Paper Code	Title of the Paper	Hours/ Week	Marks			Subject Credits
					IA	Exam	Total	
III	Part – 1 DSC	ELEDSCT3.1	Linear Integrated Circuits And 'C' Programming	4	20	80	100	3
		ELEDSCP3.1	Practical III	3	10	40	50	1
	Part – 2 SEC	ELESECT3.2	Weather Forecasting	2	10	40	50	2
		Total : Hours / Credits		9			200	6
IV	Part – 1 DSC	ELEDSCT4.1	Digital Electronics	4	20	80	100	3
		ELEDSCP4.1	Practical IV	3	10	40	50	1
	Part – 2 SEC	ELESECT4.2	Renewable Energy sources and Energy Harvesting	2	10	40	50	2
		Total : Hours / Credits		9			200	6

CHOICE BASED CREDIT SYSTEM [CBCS]
B.Sc. Program with Optional Subject: ELECTRONICS

B.Sc., ELECTRONICS Syllabus under CBCS scheme
(With effect from the academic year 2022-23 onwards)

Sem	Part	Paper Code	Title of Paper	Hours/ Week	Marks			Subject Credits
					IA	Exam	Total	
V	Part – 1 DSE	ELEDSET5.1	Communication-I	4	20	80	100	3
		ELEDSEP5.1	Practical V	3	10	40	50	1
		ELEDSET5.2A **(Elective I)**	Microprocessor -8085, Signals And Systems	4	20	80	100	3
		ELEDSEP5.2A **(Elective I)**	Practical VIA	3	10	40	50	1
		ELEDSET5.2B **(Elective II)**	Microprocessor -8085 & 8086	4	20	80	100	3
		ELEDSEP5.2B **(Elective II)**	Practical VIB	3	10	40	50	1
	Part – 2 SEC	ELESECT5.3	Basic Instrumentation Skills	2	10	40	50	2
		Total : Hours / Credits		**16**			**350**	**10**
Note: Students have to choose either Elective-I or Elective-II								
VI	Part – 1 DSE	ELEDSET6.1	Communication-II	4	20	80	100	3
		ELEDSEP6.1	Practical VII	3	10	40	50	1
		ELEDSET6.2A **(Elective III)**	Microcontroller -8051 &Embedded System	4	20	80	100	3
		ELEDSEP6.2A **(Elective III)**	Practical VIIIA	3	10	40	50	1
		ELEDSET6.2B **(Elective IV)**	Microcontroller&MATLAB	4	20	80	100	3
		ELEDSEP6.2B **(Elective IV)**	Practical VIIIB	3	10	40	50	1
	Part – 2 SEC	ELESECT6.3	Electrical Circuits And Network Skills	2	10	40	50	2
		Total : Hours / Credits		**16**			**350**	**10**
Note: Students have to choose either Elective-III or Elective-IV								

T: Theory, P: Practical, CC/EA: Co-curricular/Extension Activities. AECC: Ability Enhancement Compulsory Course, DSC: Discipline Specific Course. DSE: Discipline Specific Elective, SEC: Skill Enhancement Course).

Note: Duration of examinations is 03 Hrs for 80 Marks theory and 02 hrs for 40 marks theory. For practical's duration of examination is 03 Hrs.

Schema of Evaluation for Practical Examination

S.No	Particulars	Marks Allotted
1.	Basic formula with description, nature of graph if any & indication of unit	04
2.	Tracing of schematic ray diagram/Circuit diagram with description	04
3.	Tabulation	04
4.	Experimental skill & connection	04
5.	Record of observation and performance of experiment	08
6.	Calculation including drawing graph	06
7.	Accuracy of result with unit	02
8.	Journal assessment	04
9.	Oral performance	04
	Total	**40**

First Semester B.Sc. (Electronics)

Paper Code:ELEDSCT1.1 **Paper Title:** Network Analysis And Analog Electronics
Teaching Hours: 4 Hrs / Week **Marks:** Th-80+IA-20
Total hours:60 **Credits :**3

Unit I

- DC and AC response of electronic passive components: Review of passive components – R, L & C.
- Voltage and current sources–ideal and practical, conversion from voltage source to current source and vice versa.
- **DC Transient Analysis:** Series RC Circuit- Charging and discharging with initial charge, RC time constant.
  Series RL circuit, current at any instant during growth and decay–equations (qualitative analysis only). graphical representation, RL time constant, AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits (qualitative study-no derivations). AC applied to Series and parallel RLC circuit (qualitative study–no derivations), series and parallel resonance, condition for resonance, resonant frequency, band width, significance of quality factor, Comparison between series and parallel resonance numerical problems.
- **Transformer:** Principle, construction and working.
- **Switches:** SPST, SPDT, DPST and DPDT, fuse and electromagnetic relay, MCB and ELCB, RCCB–Qualitative studies only.

15Hours

Unit II

- **Network theorems (DC analysis only**): Review of Kirchhoff's laws, voltage divider and current divider theorems, open and short circuits. Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Reciprocity Theorem. Maximum Power Transfer Theorem. Problems.
- **Two Port Networks:** h, y and z parameters and their conversion.

15Hours

Unit III

- T and pi Networks, Network transformation T to pi and vice versa. Characteristic impedance.
- **Filters**-Concept of filters, Constant K-type filters- Low pass filter, high pass filters, band pass filters & band elimination. Derivation (Design impedance, Characteristic impedance, Cut off Frequencies, Attenuation constant and Phase constant) and design of filters.

15Hours

Unit IV

- **Junction Diode and its applications:** PN junction diode (Ideal and practical) constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics. Idea of static and dynamic resistance, Zener diode, Reverse saturation current, Zener and avalanche breakdown.
- **Rectifiers**- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms (Definition of TUF, PIV and expression for efficiency (η), ripple factor(γ) and voltage regulation), Comparison between HWR & FWR.
- **Filter**- Inductor filter, Capacitor filter, LC filter (Inductor Input) and π-section filter

(Capacitor Input) Qualitative study only.

- **Regulation**- Line and load regulation, Zener diode as voltage regulator, explanation for load and line regulation.
- **Switching Circuits:** Clipping circuits (Positive, Biased, Combination), Clamping circuits (Positive & Negative).

15Hours

REFERENCE BOOKS:

1. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9th Edition, 2013, PHI
2. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012.
3. Electronics text lab manual, Paul B. Zbar.
4. Electric circuits, JoesephEdminister, Schaums series.
5. Electric circuits Book 1, Schaums series - Syed. A. Nasar. Mc-Graw hill edition.
6. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulshresta and D.C Gupta-TMH.
7. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.
8. Principles of Electronics By- V.K. Mehta, S. Chand& Co.
9.Electronic devices, applications and Integrated circuits, Mathur, KulshreshtaandChadha, Umesh Publications.

Practical

Paper Code:ELEDSCP1.1 **Paper Title:** Practical – I

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

Demonstration experiments- not for evaluation

1. To familiarize with basic electronic components (R, C, L, diodes, transistors), digital Multimeter, Function Generator and Oscilloscope.
2. Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.

Experiments to be performed

1. Series Resonance
2. Verification of (a) Thevenin's theorem and (b) Norton's theorem.
3. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
4. Verification of the Maximum Power Transfer Theorem.
5. Study of Low pass filter T/π section.
6. Study of High pass filter T/π section.
7. Study of the I-V Characteristics of (a) P-N junction Diode, and (b) Zener diode.
8. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
9. Power supply using bridge rectifier (Internal resistance and voltage regulation).
10. Power supply using bridge rectifier with -π section filters (Internal resistance and voltage regulation).
11. Study the effect of (a) C- filter and (b) Zener regulator on the output of FWR.
12. Study of Clipping and Clamping circuits

Note: 1. Experiments are of three hours duration. 2.Minimum of eight experiments to be performed.

Second Semester B.Sc. (Electronics)

Paper Code: ELEDSCT2.1 **Paper Title:** Electronic Circuits And Special Purpose Devices
Teaching Hours: 4 Hrs / Week **Marks:** Th-80+IA-20
Total hours :60 **Credits :**3

Unit I

- **Bipolar Junction Transistor:** Bipolar Junction Transistor: Construction, working and characteristics of three modes (CB, CE and CC), relation between α, β and γ. Regions of operation (active, cut off and saturation). Problems.
- **Transistor biasing:** Need for biasing, DC load line, operating point, thermal runaway, stability and stability factor. Different types of biasing– Fixed bias, collector to base bias, Emitter feedback bias, voltage divider bias, (Explanation Q point derivation. advantages& disadvantages in each case). Transistor as a switch – circuit and working. Problems.

15Hours

Unit II

- **Small Signal Amplifiers:** Classification of amplifiers based on different criteria, small signal CE amplifier-circuit, working, frequency response.
- **Hybrid model**: h-parameter, Determination of h-parameter of transistor for CE configuration, derivation for Av, expressions for Zin and Zout using h-parameters. Numerical problems on Av, Zin and Zout.
- **Cascaded Amplifiers: Two stage RC Coupled Amplifier and its Frequency Response.**
- **Power amplifier:** Introduction, Classification of power amplifiers, Conversion efficiency of class A amplifier, class B amplifier and class Camplifier (Qualitative only). Transformer coupled push pull amplifier.
- **FET:** Introduction, FET types, JFET – construction, working, characteristics, parameters and their relationships. Comparison of BJT & FET.
- **JFET Amplifier:** CS – mode, operation and expression for Zi, Zo& Av. Problems
- **MOSFET**-Types, circuit symbols of depletion type MOSFET (both N channel and P Channel). Circuit symbols of enhancement type MOSFET (both N channel and P channel). N channel enhancement type MOSFET-construction, working, characteristic curves (without experimental circuit).

15Hours

Unit III

- **Feedback:** Concept of feedback, types of feedback-positive & negative feedback, advantages and disadvantages for each, negative feedback configurations. Voltage series, voltage shunt, current series and current shunt (block diagram representation for each). Voltage Series negative feedback-effect of negative feedback on voltage gain-derivation, effect of negative feedback (no derivations) on Zi, Zo, BW, noise & distortion and stability. Numerical problems.
- **Sinusoidal Oscillators**-damped and undamped oscillations, basic principle of oscillator, positive feedback, Barkhausen criterion. Classification of oscillators-LC, RC

and crystal oscillators, Colpitts& Hartley oscillators using transistors – circuit diagrams, working (no derivations). Equivalent circuit of a piezo electric crystal, working of Colpitt's crystal oscillator. Types of RC oscillators (mention only) numerical problems.

- **Multivibrator**: Types, block diagrams of astable, monostable &bistablemultivibrators with waveforms. Circuit diagram and working of astable multivibrator using transistors (no derivation).

15Hours

Unit IV

- **UJT-** Basic construction, equivalent circuit, intrinsic standoff ratio, working, characteristics and relaxation oscillator-expression of frequency. Numerical problems.
- **SCR**-construction, working, characteristic curves, explanation of working by using equivalent circuit, full wave-controlled rectifier-derivations for average values of load current and voltage, numerical problems.
- **Triac and Diac** – Circuit symbol, construction, working, characteristic curves and applications (mention only).
- **LED**– Circuit symbol, operation and applications (mention only) and 7 segment display-common cathode and common anode (mention only).
- **LCD –**Types, applications (mention only), advantages over LED.
- **Special purpose devices:** Tunnel diode, Varactor diode, Photo diode, Photo transistor & Solar cell – circuit symbol, working, characteristics, applications (mention only).

15Hours

REFERENCE BOOKS:

1.Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012.

2. Electronics text lab manual, Paul B. Zbar.

3. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulshresta and D.C

4. Gupta-TMH.

5. Electronic devices, David A Bell, Reston Publishing Company/DB TarapurwalaPubl.

6. Principles of Electronics By V.K. Mehta, S. Chand& Co.

7. Electronic devices, applications and Integrated circuits, Mathur, Kulshreshta and Chadha, Umesh Publications.

Practical

Paper Code: ELEDSCP2.1 **Paper Title:** Practical – II

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

Section-A: –Demonstration experiment - not for Evaluation

1. Measurement of voltage, time period and frequency using C.R.O.

Section-B: –Performance experiments

1. CE Amplifier – frequency response
2. CC amplifier – voltage gain at one frequency, input and output impedances
3. FET characteristics
4. MOSFET characteristics
5. Common source FET amplifier
6. Study of Hartley oscillator
7. Study of Colpitt's oscillator
8. UJT characteristics
9. UJT relaxation oscillator.
10. SCR characteristics.
11. LED Characteristics
12. Solar cell characteristics

Note:

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be performed.

Third Semester B.Sc. (Electronics)

Paper Code: ELEDSCT3.1 **Paper Title:** Linear Integrated Circuits And 'C' Programming
Teaching Hours: 4 Hrs / Week **Marks:** Th-80+IA-20
Total Hours: 60 **Credits :**3

Unit I

- **OPERATIONAL AMPLIFIER:** Qualitative study of Differential Amplifier, four modes of Differential Amplifier, Basic information of Op-amp (Types of IC Manufactures designations Package Types, Temperature ranges and pin identifications etc.), Mention 3 different op-amp ICs, Mono, dual and quad op-amp ICs (mention only). 741, OP 07, LM 308, etc. and their comparison with respect to parameters, limitations of op-amp in open loop mode. block diagram of Op-amp, ideal version of operational amplifier. Op-amp as inverting & non-inverting amplifier (open loop), Operational amplifier parameters input offset voltage, input offset current, input bias current, Total output offset voltage Thermal drift, CMRR and Slew Rate Explanation of voltage offset null circuit for 741. Concept of virtual ground. Voltage series (non-inverting) and Voltage-shunt (Inverting) negative feedback circuits derivation of voltage gain input resistance, output resistance bandwidth and Total output offset voltage, numerical problems.

15 Hours

Unit II

- **APPLICATIONS OF OP-AMPLIFIER:** Op-amp adder, Subtractor. Current to Voltage converter and Voltage to Current converter circuits, Low voltage DC voltmeter, Integrator, Differentiator, Qualitative study of op-amp as comparator. Peaking amplifier.
- **Filter:** First order active filters- low pass & high pass Circuit diagrams, derivation for cut-off frequency. Study of band pass, band reject filters. (Qualitative only).
- **Timer (IC 555):** Functional block diagram, Multivibrator–types (mention only), Astable Multivibrator – circuit with 555 timer and working, derivation of frequency of oscillations, numerical problems. Monostable multivibrator using 555 working and derivation of time period T, numerical problems.

15 Hours

Unit III

- Computer programming Preliminaries, Algorithm, Flowcharts and their symbols, some simple examples.
- **INTRODUCTION TO C-PROGRAMMING:** Characteristics of C language, Applications of C. Basic Structure of C program, Execution of C. C tokens, key words, identifiers, Constants, Variables and data types. Declaration of variables, assigning values to variables, defining symbolic constants. Operators and expressions (All type), conditional operator.

15 Hours

Unit IV

- **DECISION MAKING & BRANCHING:** Conditional & control statements: if statement, if-else statement, Nested if statement, Switch statement and goto- statement.
- **Loop control structures**: while, do-while and for statements. Break and continue statements.
- **ARRAY AND STRING HANDLING PROGRAMS:** One- and two-dimensional arrays, Declaration and initialization of arrays, multidimensional arrays. Strings, Declaring and initializing of string variables, reading and writing of strings, String handling functions.

15 Hours

REFERENCE BOOKS:

1. Liner Integrated circuits by Roy Choudhury, New age international, 4th edition,2010
2. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012.
3. Electronics text lab manual, Paul B. Zbar.
4. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.
5. Electronic devices, applications and Integrated circuits, Mathur, Kulshreshta and Chadha, Umesh Publications.
6. Computer concepts and C Programming techniques by Padma Reddy, Nandi publications, 4th edition, 2010.

Practical

Paper Code: ELEDSCP3.1 **Paper Title:** Practical -**III**

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

Note: Experiments on Linear Integrated circuits (AT LEAST 05 EXPERIMENTS)

1. To design inverting amplifier using Op-amp & study its frequency response
2. To design non-inverting amplifier using Op-amp & study frequency response
3. Op-amp as Adder and subtractor.
4. Op-amp as an Integrator.
5. Op-amp as a Differentiator.
6. Study of first order low-pass filter and high-pass filter.
7. Astable multivibrator using IC-555.
8. Monostable multivibrator using IC-555.

Experiments on 'C' Programming (AT LEAST 03 EXPERIMENTS)

1. Write a C program To Find the Roots of quadratic equation.
2. Write a C program To Find the Factorial of the given number.
3. Write a C program To Find the largest of three numbers.
4. Write a C program To find the leap year.
5. Write a C program to generate first N Fibonacci numbers and print the result.
6. Write a C program to find the area of a triangle

Note:

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be performed**.**

Third Semester B.Sc. (Electronics) Skill Enhancement Course

Paper Code: ELESECT3.2 **Paper Title:** Weather Forecasting
Teaching Hours: 2Hrs / Week **Marks:** Th-40+IA-10
Total Hours :30 **Credits :**2

The aim of this course is not just to impart theoretical knowledge to the students butto enable them to develop an awareness and understanding regarding the causes andeffects of different weather phenomenon and basic forecasting techniques

Unit I

- **Introduction to atmosphere:** Elementary idea of atmosphere: physical structure and composition; compositional layering of the atmosphere; variation of pressure and temperature with height; air temperature; requirements to measure air temperature; temperature sensors: types; atmospheric pressure: its measurement; cyclones and anticyclones: its characteristics.

9 Hours

- **Measuring the weather:** Wind; forces acting to produce wind; wind speed direction: units, its direction; measuring wind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission and scattering in atmosphere; radiation laws.

4 Hours

- **Weather systems:** Global wind systems; air masses and fronts: classifications; jet streams; local thunderstorms; tropical cyclones: classification; tornadoes; hurricanes.

3 Hours

Unit II

- **Climate and Climate Change:** Climate: its classification; causes of climate change; global warming and its outcomes; air pollution; aerosols, ozone depletion, acid rain, environmental issues related to climate.

6 Hours

- **Basics of weather forecasting:** Weather forecasting: analysis and its historical background; need of measuring weather; types of weather forecasting; weather forecasting methods; criteria of choosing weather station; basics of choosing site and exposure; satellites observations in weather forecasting; weather maps; uncertainty and predictability; probability forecasts.

8 Hours

Demonstrations and Experiments:

1. Study of synoptic charts & weather reports, working principle of weather station.
2. Processing and analysis of weather data:
(a) To calculate the sunniest time of the year.
(b) To study the variation of rainfall amount and intensity by wind direction.
(c) To observe the sunniest/driest day of the week.
(d) To examine the maximum and minimum temperature throughout the year.
(e) To evaluate the relative humidity of the day.
(f) To examine the rainfall amount month wise.

3. Exercises in chart reading: Plotting of constant pressure charts, surfaces charts, upper wind charts and its analysis.
4. Formats and elements in different types of weather forecasts/ warning (both aviation and non aviation)

REFERENCE BOOK:

1. Aviation Meteorology, I.C. Joshi, 3rd edition 2014, Himalayan Books
2. The weather Observers Hand book, Stephen Burt, 2012, Cambridge University Press.
3. Meteorology, S.R. Ghadekar, 2001, Agromet Publishers, Nagpur.
4. Text Book of Agro meteorology, S.R. Ghadekar, 2005, Agromet Publishers, Nagpur
5. Atmosphere and Ocean, John G. Harvey, 1995, The Artemis Press.

Fourth Semester B.Sc. (Electronics)

Paper Code: ELEDSCT4.1 **Paper Title:** Linear Integrated Circuits And 'C' Programming
Teaching Hours: 4Hrs / Week **Marks:** Th-40+IA-10
Total hours :60 **Credits 3**

Unit I

- **Number System and Codes:** Binary, decimal, hexadecimal – conversion from binary to decimal and vice-versa, binary to hexadecimal and vice-versa, decimal to hexadecimal and vice versa, addition and subtraction of binary numbers and hexadecimal numbers. Subtraction using 2's complement, signed number arithmetic – addition. Types of codes–BCD code, gray code, gray to binary conversion and vice versa, excess – 3 Code - self complementing property, ASCII and EBCDIC, numerical problems.

15Hours

Unit II

- **Logic Gates:** Truth Tables of OR, AND, NOT, NOR, NAND, XOR, XNOR, Universal Gates. Pin configuration of IC (7400, 7402, 7404, 7408, 7432, 7486,7466).
- **Boolean algebra:** Basic postulates and fundamental theorems of Boolean algebra. Principle of Duality, De Morgan`s theorems. Simplification of Boolean Expressions, logic circuit for the Boolean expression and vice – versa.
- **Combinational Logic Analysis and Design:** Standard representation of logic functions (SOP and POS), Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP), numerical problems.

15 Hours

Unit III

- **Arithmetic Circuits:** Binary Addition. Half and Full Adder. Half and Full Subtractor, 4bit binary Adder/Subtractor.
- **Data processing circuits:** Multiplexers (2x1,4 x 1 & 8x1), De-multiplexers- (1 x 4 &1x8)Applications of IC 74154, Decoders (3 to 8 line -IC 74X138) ,2:4 decoder using AND gates, 3:8 decoder using NAND gates, BCD to decimal decoderIC-7445, BCD to 7 segment decoders-IC 7447, 4:1, 8:1 Encoders (Decimal to BCD encoder IC 74XX147, priority encoder-IC 74XX148). Magnitude comparator -Two-bit comparator, 4-bit comparator (IC 7485).
- **Sequential Circuits:** SR, D, T and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. Master-slave JK Flip-Flop. **15Hours**

Unit IV

- **Shift registers:** Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).
- **Counters (4 bits):** Ring Counter, Johnson counter, Asynchronous Counters-Logic diagram, Truth table and timing diagrams of 3-bit ripple counter, 3 bit Up-Down counter, Decade Counter. Synchronous Counter.
- **D-A and A-D Conversion:** 4 bit binary weighted and R-2R D-A converters, circuit and working. Accuracy and Resolution. A-D conversion characteristics, successive approximation ADC. (Mention of relevant ICs for all). **15Hours**

REFERENCE BOOKS:

1. Digital Principles and applications: Malvino and Leach-TMH 3rd edition
2. Digital Systems: Ronald J Tocci, PHI.
3. Design with TTL ICs, Robert L Morries, TMH.
4. Digital Logic and Computer design: M. Morris Mano- PHI, new edition
5. Digital Design: M. Morris Mano- PHI 2nd edition, 2000.
6. Digital computer Electronics: Malvino-TMH
7. Digital computer Fundamentals: Thomas C. Bartee-TMH
8. Experiments in digital principles: Malvino and Leach-TMH

Practical

Paper Code: ELEDSC P4.1 **Paper Title:** Practical -**IV**

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

1. Realization of logic gates using IC-7400 (AND, OR, NOT, XOR. NOR, NAND)
2. Verification of Boolean Expressions and De Morgan's theorems using NAND gates
3. Half adder and full adder using logic gates.
4. Half subtractor and full subtractor using logic gates.
5. Gray to binary conversion and binary to gray conversion using XOR gates.
6. Multiplexer using logic gates
7. Demultiplexer using logic gates.
8. RS/ JK/ D / T flip-flop using logic gates.
9. Decade counter using JK flip-flop.
10. 4- bit up and down counters
11. Shift Registers using D-flip-Flop (Serial in – Serial out).
12. Shift Registers using D-flip-Flop (Parallel in – Parallel out).

Note:

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be performed**.**

Fourth Semester B.Sc. (Electronics) Skill Enhancement Course

Paper Code: ELESECT4.2 **Paper Title:** Renewable Energy sources and Energy Harvesting
Teaching Hours: 2Hrs / Week **Marks:** Th-40+IA-10
Total hours: 30 **Credits 2**

The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible.

Unit I

- **Fossil fuels and Alternate Sources of energy:** Fossil fuels and nuclear energy, theirlimitation, need of renewable energy, non-conventional energy sources. An overview of
  developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, OceanThermal Energy Conversion, solar energy, biomass, biochemical conversion, biogasgeneration, geothermal energy tidal energy, Hydroelectricity.

  3 Hours
- **Solar energy**: Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PVmodels and equivalent circuits, and sun tracking systems.

  6 Hours
- **Wind Energy harvesting**: Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

  3 Hours
- **Ocean Energy**: Ocean Energy Potential against Wind and Solar, Wave Characteristics and Statistics, Wave Energy Devices.

  3 Hours

- Tide characteristics and Statistics, Tide Energy Technologies, Ocean Thermal Energy, Osmotic Power, Ocean Bio-mass.

  2 Hours

Unit II

- **Geothermal Energy**: Geothermal Resources, Geothermal Technologies.

  2 Hours
- **Hydro Energy**: Hydropower resources, hydropower technologies, environmental impact of hydro power sources.

  2 Hours
- **Piezoelectric Energy harvesting**: Introduction, Physics and characteristics of piezo- electric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modelling piezoelectric generators, Piezoelectric energy harvesting applications, Human power

  4 Hours

- **Electromagnetic Energy Harvesting**: Linear generators, physics mathematical models, recent applications.

2 Hours

- Carbon captured technologies, cell, batteries, power consumption.

2 Hours

- Environmental issues and Renewable sources of energy, sustainability.

1 Hours

Demonstrations and Experiments

1. Demonstration of Training modules on Solar energy, wind energy, etc.
2. Conversion of vibration to voltage using piezoelectric materials
3. Conversion of thermal energy into voltage using thermoelectric modules.

REFERENCE BOOKS:

- Non-conventional energy sources, B.H. Khan, McGraw Hill
- Solar energy, Suhas P Sukhative, Tata McGraw - Hill Publishing Company Ltd.
- Renewable Energy, Power for a sustainable future, Godfrey Boyle, 3rd Edn.,2012, Oxford University Press.
- Renewable Energy Sources and Emerging Technologies, Kothari et.al., 2nd Edition, PHI Learning.
- Solar Energy: Resource Assessment Handbook, P Jayakumar, 2009.
- J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
- http://en.wikipedia.org/wiki/Renewable_energy.

Fifth Semester B.Sc. (Electronics)

Paper Code: ELEDSET5.1 **Paper Title:** Communication-I
Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20
Total hours:60 **Credits 3**

Unit I: Transmission lines & Analog Modulation

- **Noise** -Introduction, internal and external noises, signal to noise ratio and noise figure-numerical examples.
- **Transmission lines** - Introduction, different types of transmission lines (parallel and co-axial lines) current and voltage relation on RF transmission lines.
- Electromagnetic radiation, different layers of Ionosphere and wave propagation through them. Skip-distance, Maximum usable frequency. Virtual height, Critical frequency, Critical angle, Secant law and fading.
- **Analog Modulation techniques**
  Block diagram of electronic communication system. Modulation-need and types of modulation-AM, FM & PM.
- **Amplitude modulation** – representation, modulation index, expression for instantaneous voltage, power relations, frequency spectrum, DSBFC, DSBSC and SSBSC (mention only), AM collector modulator. Limitations of AM.
- **Frequency Modulation**- definition, modulation index, FM frequency spectrum diagram, bandwidth requirements, frequency deviation and carrier swing, FM generator-varactor diode modulator.

15Hours

Unit II: Transmitters and Radio receivers

- **Transmitters**: Block diagram of AM transmitter and FM transmitter with AFC, qualitative study of pre-emphasis. Comparison of AM and FM, Diode modulator, Transistor modulator (collector to base), numerical examples.
- **Demodulation:**AM detection-principles of detection, Diode AM detector, transistor AM detector, FM detector- slope detector-circuit working, balanced slope detector, Foster-Seeley discriminator and ratio detector (Qualitative).
- **AM super heterodyne receiver**– principle, block diagram, function of each stage.
- **FM super heterodyne receiver**– principle, block diagram, function of each stage.
- **Radio receiver characteristics:** Characteristics of radio receivers-qualitative study of sensitivity, selectivity, signal to noise ratio, fidelity, stability, image frequency and its rejection.

15Hours

Unit III: Antenna& Transducers

- **Antenna:** Radiation mechanism, Hertzian Dipole, Theory of dipole antenna, polar diagrams of dipole antenna, radiation resistance, efficiency, study of yagi and dish antenna. Feed mechanism, Cassegrain feed antenna.
- Qualitative study of Helical antenna, Loop antenna, Parabolic reflector, Horn antenna and Micro strip antenna.

- **Transducers**: Introduction - General measurement system – characteristics - definition – static& dynamic transducers, Different types - resistive transducer - strain gauge –capacitive - inductive transducers - LVDT (variable inductive transducers), temperature transducers, thermo couple, thermistors.
- Microphones (Carbon, Condenser), Loud Speakers (Moving Coil) Types of Speakers based on frequency (Woofer, Tweeter).

15Hours

Unit IV: Optical Fiber Communication

- Introduction – need for OFC. Block diagram of OFC system. Fiber optic cables, light propagation through fiber – step index fiber, graded index fiber, Snell's law, numerical aperture (derivation). Types of optical fiber cables, light sources – requirements, LEDs and semiconductor laser diodes. Photo detectors – PN, PIN and avalanche photodiodes. Losses in optical fibers – Rayleigh scattering, absorption, leaky modes, bending, joint junction losses. Advantages and disadvantages of OFC over metallic cables.

15Hours

REFERENCE BOOKS:

1. Electronic Communication Systems - by Kennedy and Davis (TATA McGraw –HILL EDITION

2. Electronic Communication, Roddy and Coolen, 4th edition, PHI

3. Transducers and Instrumentation by- DVS Murthy, PHI 1995

4. Optical Fiber Communication by- Gerd Keyser

5. Instrumentation Measurements and Communication by -B C Kakra and K KChoudhary, TMH1985

6. Hand Book of Electronics by -Gupta and Kumar

7. Electronics Instrumentation by- Kalsi

Practical

Paper Code: ELEDSC P5.1 **Paper Title:** Practical **– V**
Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10
Credits :1

: Practical

1. Amplitude modulator and Amplitude demodulator
2. Frequency modulation and demodulation
3. Diode as a detector (Sketch input and output wave forms)
4. Straight radio receiver (Selectivity, Sensitivity)
5. Selectivity of a super heterodyne radio receiver
6. Time Division Multiplexing and de multiplexing
7. Frequency Multiplexing
8. Radiation pattern studies of different dipole Antenna
9. Studies on Antenna equivalent circuits.

10. Temperature transducers (Application of Thermistor)
11. Speaker characteristics and comparison (Tweeter, Woofer)
12. Microphones characteristics and comparison (Carbon, Diaphragm)
13. Numerical aperture of OFC
14. Characteristics of OFC

Note:

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be performed.

Fifth Semester B.Sc. (Electronics) Elective - I

Paper Code: ELEDSET5.2A **Paper Title:** Microprocessor-8085, Signals And Systems
Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20
Total hours:60 **Credits 3**

Unit I: MICROPROCESSOR ARCHITECTURE AND INSTRUCTIONS

- **Microprocesso**r – Introduction Intel 8085, application, basic block diagram, speed, word size, memory capacity and classification.
- **Microprocessor 8085** – Features and architecture. Pin diagram of 8085.
- **Supporting circuits;** clock circuits, request circuits, generation of control signals. Bus drivers.
- **Instruction set**-Classification, Addressing modes, Status flags and instruction formats, Operation code, Operand, Mnemonics.

15Hours

Unit II: STACK OPERATIONS AND PROGRAMMING

- Program counter, Stack, Stack pointer operations, subroutine, calls and return operations. Interrupts. Delay loops, Timing diagrams- instruction cycle, machine cycle and T-states. Timing diagrams of Opcode fetch cycle, Memory read cycle & Memory write cycle.
- Programming preliminaries, Assembler concept, Programs of data transfer and memory operation (direct and indirect addressing) addition and subtraction of two 8 bit and 16-bit numbers, multiplication and division of 8-bit numbers, display of largest and smallest numbers in a given array of numbers, Sorting of numbers in descending/ascending order, Number of 1's and 0's in a given bytes, Testing for zero condition.1's and 2's compliments. Verification of truth tables of logic gates, Program to add two n byte numbers, Program to generate Fibonacci series up to the limit, Program to find the factorial of a number, Program to find the GCD of two integer numbers.

15Hours

Unit III: INTERFACING OF 8085

- **Interfacing;** Basic interfacing concepts, compatible IC of 8085,
- **Interfacing Techniques:** Memory mapped I/O, I\O mapped I\O. Memory interfacing, I/O interfacing, I/O devices,
- **Programmable interval timer (8253):** Need for8253, features, Block diagram, pin diagram, operating modes, D to A converter using 8085 and op-amp.
- **Programmable peripheral Interface IC 8255:** features, pin diagram, functional block diagram ports and their modes.

15Hours

Unit IV: SIGNALS AND SYSTEMS

- **Discreate -Time signals and Systems**: Definition of signals and systems, Classification of signals, Transformation of the Independent Variables, Periodic and Aperiodic signals, Energy and Power Signals, Even and Odd Signals, Discrete-Time System, System Properties, Impulse Response.
- **Convolution Sum:** Graphical Method, Analytical Method, Properties of Convolution; Commutative; Associative; Distributive; Shift; Sum Property System Response to Periodic

Inputs, Relationship between LTI system Properties and the Impulse Response; Causality; Stability; Invertibility, Unit Step Response.

15Hours

REFERENCE BOOKS:

1. Microprocessor Architecture, Programming and applications with the 8085by- Ramesh Gaonkar
2. Microprocessor 8085 by- B. Ram
3.Microprocessor 8085 and its interface by Sunil Mathur
3. Microprocessor and Microcontrollers 8085,8086 and 8051 by- Amar K. Gangully&AnuvaGanguly
4.Signals & Systems-Dr. J.S. Chitode Technical Publication Pune

Practical, Elective I

Paper Code: ELEDSE P5.2A **Paper Title:** Practical – **VIA**
Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10
Credits :1

Minimum EIGHT experiments are to be performed in the semester course using 8085.

1. Addition and Subtraction.
2. Multiplication and Division.
3. Largest and smallest of an array.
4. Arranging an array of numbers in ascending and descending order.
5.Sorting of numbers in descending/ascending order
6, Number of 1's and 0's in a given bytes
7.Testing for zero condition.1's and 2's compliments
8.Verification of truth tables of logic gates
9.Program to add two n byte numbers
10.Program to generate Fibonacci series up to the limit
11Program to find the factorial of a number
12.Program to find the GCD of two integer numbers.

Note:

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be performed

Fifth Semester B.Sc. (Electronics) Elective II

Paper Code: ELEDSET 5.2B **Paper Title:** Microprocessor -8085, 8086
Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20
Total hours:60 **Credits 3**

Unit I: MICROPROCESSOR ARCHITECTURE AND INSTRUCTIONS

- **Microprocesso**r – Introduction Intel 8085, application, basic block diagram, speed, word size, memory capacity and classification.
- **Microprocessor 8085** – Features and architecture. Pin diagram of 8085.
- **Supporting circuits;** clock circuits, request circuits, generation of control signals. Bus drivers.
- **Instruction set**-Classification, Addressing modes, Status flags and instruction formats, Operation code, Operand, Mnemonics.

15Hours

Unit II: STACK OPERATIONS AND PROGRAMMING

- Program counter, Stack, Stack pointer operations, subroutine, calls and return operations. Interrupts. Delay loops, Timing diagrams- instruction cycle, machine cycle and T-states. Timing diagrams of Opcode fetch cycle, Memory read cycle & Memory write cycle.
- Programming preliminaries, Assembler concept, Programs of data transfer and memory operation (direct and indirect addressing) addition and subtraction of two 8 bit and 16-bit numbers, multiplication and division of 8-bit numbers, display of largest and smallest numbers in a given array of numbers, Sorting of numbers in descending/ascending order, Number of 1's and 0's in a given bytes, Testing for zero condition.1's and 2's compliments. Verification of truth tables of logic gates, Program to add two n byte numbers, Program to generate Fibonacci series up to the limit, Program to find the factorial of a number, Program to find the GCD of two integer numbers.

15Hours

Unit III: INTERFACING OF 8085

- **Interfacing;** Basic interfacing concepts, compatible IC of 8085,
- **Interfacing Techniques:** Memory mapped I/O, I\O mapped I\O. Memory interfacing, I/O interfacing, I/O devices,
- **Programmable interval timer (8253):** Need for8253, features, Block diagram, pin diagram, operating modes, D to A converter using 8085 and op-amp.
- **Programmable peripheral Interface IC 8255:** features, pin diagram, functional block diagram ports and their modes.

15Hours

Unit IV: MICROPROCESSOR 8086

- Introduction 8086, feature of 8086, Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization-General purpose registers, Segment Registers, Pointers and index Registers, Flag Registers. Bus Operation, memory segmentation, Addressing Modes-Data addressing modes, Program memory addressing modes, Stack memory addressing modes
- **Instruction Set of 8086:** Addressing Modes, Instruction format, Discussion on instruction

Set groups- data transfer, arithmetic, logic string, branch control transfer, processor control.
Interrupts: Hardware and software interrupts, responses and types

15Hours

REFERENCE BOOKS:

1. Microprocessor Architecture, Programming and applications with the 8085by- Ramesh Gaonkar
2. Microprocessor 8085 by- B. Ram
3.Microprocessor 8085 and its interface by Sunil Mathur
3. Microprocessor and Microcontrollers 8085,8086 and 8051 by- Amar K. Gangully &AnuvaGanguly
4.Signals & Systems-Dr. J.S. Chitode Technical Publication Pune

Practical, Elective II

Paper Code: ELEDSEP5.2B **Paper Title:** Practical – **VIB**

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

Minimum EIGHT experiments are to be performed in the semester course using 8085.

1. Addition and Subtraction.
2. Multiplication and Division.
3. Largest and smallest of an array.
4. Arranging an array of numbers in ascending and descending order.
5.Sorting of numbers in descending/ascending order
6, Number of 1's and 0's in a given bytes
7.Testing for zero condition.1's and 2's compliments
8.Verification of truth tables of logic gates
9.Program to add two n byte numbers
10.Program to generate Fibonacci series up to the limit
11Program to find the factorial of a number
12.Program to find the GCD of two integer numbers.

Note:

1. Experiments are of three hours duration.
2. Minimum of eight experiments to be perform

Fifth Semester B.Sc. (Electronics) Skill Enhancement Course

Paper Code: ELEDSCT 5.3 **Paper Title:** Basic Instrumentation Skills

Teaching Hours: 3Hrs / Week **Marks:** Th-40+IA-10

Total hours :30

Credits 2

This course is to get exposure with various aspects of instruments and their usage throughhands-on mode. Experiments listed below are to be done in continuation of the topics

Unit I:

- **Basic of Measurement:** Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects.
- **Multimeter:** Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

4 Hours

- **Electronic Voltmeter:** Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/Multimeter and their significance.
- AC millivoltmeter: Type of AC millivoltmeters: Amplifier- rectifier, and rectifier- amplifier. Block diagram ac millivoltmeter, specifications and their significance.

4 Hours

- **Cathode Ray Oscilloscope:** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls. Specifications of a CRO and their significance.

6 Hours

- Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.

3 Hours

Unit II:

- **Signal Generators and Analysis Instruments:** Block diagram, explanation and specifications of low frequency signal generators. pulse generator, and function generator. Brief idea for testing, specifications. Distortion factor meter, wave analysis.

4 Hours

- **Impedance Bridges & Q-Meters:** Block diagram of bridge. working principles of basic (balancing type) RLC bridge. Specifications of RLC bridge. Block diagram & working principles of a Q- Meter. Digital LCR bridges.

4 Hours

- **Digital Instruments:** Principle and working of digital meters. Comparison of analog & digital instruments. Characteristics of a digital meter. Working principles of digital voltmeter.

4 Hours

- **Digital Multimeter:** Block diagram and working of a digital multimeter. Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time- base stability, accuracy and resolution. 4 Hours

The test of lab skills will be of the following test items:

1. Use of an oscilloscope.
2. CRO as a versatile measuring device.
3. Circuit tracing of Laboratory electronic equipment,
4. Use of Digital multimeter/VTVM for measuring voltages
5. Circuit tracing of Laboratory electronic equipment,
6. Winding a coil / transformer.
7. Study the layout of receiver circuit.
8. Trouble shooting a circuit
9. Balancing of bridges

Laboratory Exercises:

1. To observe the loading effect of a multimeter while measuring voltage across a lowresistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q- meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of time period, frequency, average period using universal counter/frequency counter.
6. Measurement of rise, fall and delay times using a CRO.
7. Measurement of distortion of a RF signal generator using distortion factor meter.
8. Measurement of R, L and C using a LCR bridge/ universal bridge.

Open Ended Experiments:

1. Using a Dual Trace Oscilloscope
2. Converting the range of a given measuring instrument (voltmeter, ammeter)

REFERENCE BOOKS:

- A text book in Electrical Technology - B L Theraja - S Chand and Co.
- Performance and design of AC machines - M G Say ELBS Edn.
- Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
- Logic circuit design, Shimon P. Vingron, 2012, Springer.
- Digital Electronics, SubrataGhoshal, 2012, Cengage Learning.
- Electronic Devices and circuits, S. Salivahanan& N. S. Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill
- Electronic circuits: Handbook of design and applications, U.Tietze, Ch.Schenk,2008, Springer
- Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India

Sixth Semester B.Sc. (Electronics)

Paper Code: ELEDSET6.1 **Paper Title:** COMMUNICATION-II
Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20
Total Hours: 60 **No of credits :**3

Unit I: Digital communication

- Introduction to pulse and digital communications, digital radio, sampling theorem, types- PAM, PWM, PPM, PCM – quantization, advantages and applications, digital modulations (FSK, PSK, and ASK). Advantage and disadvantages of digital transmission, characteristics of data transmission circuits – Shannon limit for information capacity, bandwidth requirements, data transmission speed, noise, cross talk, echo suppressors, distortion and equalizer, MODEM– modes, classification, numerical problems.

15Hours

Unit II: Satellite Communication

- Introduction, satellite orbits, Satellite system -Block diagram of satellite sub systems, up link, down link, cross link, C-band transponders, Space segment, ground station (simplified Block diagram of earth station). Multiple access methods -TDMA, FDMA, CDMA, GPS-service's like SPS & PPS, numerical problems.

15Hours

Unit III: Cellular Communication and Wireless LANs

- **Concept of cellular mobile communication** – cell and cell splitting, frequency bands used in cellular communication, absolute RF channel numbers (ARFCN), frequency reuse, roaming and hand off, authentication of the SIM card of the subscribers, IMEI number, concept of data encryption, architecture (block diagram) of cellular mobile communication network, CDMA technology, CDMA overview, simplified block diagram of cellular phone handset, Comparative study of GSM and CDMA, 2G, 3G and 4G concepts, numerical problems.

15Hours

Unit IV: Television

- **Television receiver circuit:** Monochrome TV Block diagram Each block explanation. Gross structure, Image continuity, Horizontal and vertical scanning, Number of scanning lines, Flicker, Interlaced scanning, Fine structure, Composite video signal (Detail study), Blanking pulses, Horizontal and vertical synchronization, Equalizing pulses, Channel bandwidth, vestigial side band transmission. T.V. Signal standards, numerical problems.
- **Colour Television**
  Essentials of colour T.V. (compatibility, natural light, three colour theory grass man law), Luminance, Hue and Saturation, Chromaticity diagram, Luminance signal(Y), Production of colour difference voltage, Delta gun colour picture tube, Detail description of each block of colour television. Concept of CCTV, HDTV, Picture in Picture, Picture phones, numerical examples wherever applicable, numerical problem.

15Hours

REFERNCE BOOKS:

1. Electronic Communication, George Kennedy, 3rd edition, TMH.
2. Electronic Communication, Roddy and Coolen, 4th edition, PHI.
3. Electronic Communications Systems, Wayne Thomasi, 5th edition.
4. Digital Communication System: Ronald J Tocci.
5. Monochrome and Colour television, R.R. Gulati, New Age International.
6. Colour TV Principle & Practice, R.R. Gulati, New Age international.
7. Basic Television Principle & Servicing, Bernard Grob, McGraw Hill.
8. Television and Video Engg-A.M. Hake, Tata McGraw Hill Publishing
9. Principles of Electronics By V K Mehta
10. Communication By Gupta and Kumar.
11. Electronic Communication systems, Fundamentals through Advanced, Wayne Tomasi - 5th edition.

Practical

Paper Code: ELEDSE P6.1 **Paper Title:** Practical – **VIIIA**

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

Communication Experiments.

1. ASK modulator and demodulator
2. FSK modulation
3. PWM modulator and demodulator
4. PPM modulator and demodulator
5. PAM modulator and demodulator
6. Time Division Multiplexing and de multiplexing

Microcontroller Experiments

7. Addition and Subtraction Programming using 8051.
8. Multiplication and Division Programming using 8051.
9. Largest and smallest of an array Programming using 8051.
10. Arranging an array of numbers in ascending order and descending order Programming using 8051.

Sixth Semester B.Sc. (Electronics) Elective III

Paper Code: ELEDSET6.2A **Paper Title: Microcontroller -8051 & Embedded System**
Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20
Total hours :60 **credits :**3

Unit I: Introduction to Microcontrollers

- Introduction, Microprocessor and Microcontrollers, RISC and CISC architectures, Harvard and Von-Neumann CPU architecture.
- **Microcontroller 8051:** Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, Internal RAM memory, Internal ROM. General purpose data memory, special purpose/function registers, external memory, Stacks.

15Hours

Unit II:8051- Addressing Modes & Instruction set

- **Addressing Modes:** Introduction, Instruction syntax, Data types, Subroutines, Addressing Modes-Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, Absolute addressing, Long addressing, Index addressing, Bit inherent addressing, Bit direct addressing.
- **Instruction set-**Instruction timings,8051 instructions: Data transfer instructions, Arithmetic instruction, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction.

15Hours

Unit III:8051-Programming & Interrupts

- **Programming:** Assembler directives, Assembly language programs-Addition of two 8-bit numbers Subtraction of two 8-bit numbers, Multiplication of two 8-bit numbers, Division of two 8-bit numbers. Largest and smallest of an array, Arranging an array of numbers in ascending order and descending order.
- **Interrupts:** Basics of interrupts, Classification of interrupts-Maskable, Non maskable, Vectored, Non vectored interrupts, Interrupts structure, Interrupt control, Interrupt Priority and Interrupt Destinations.

15Hours

Unit IV:PIC microcontrollers & Embedded system

- **PIC microcontrollers**
  Core features of PIC microcontrollers, overview of various PIC microcontroller series. PIC 16F877A-features, pin diagram, I/O ports.
- **Introduction to embedded system:**
  Embedded systems and general-purpose computer systems. Architecture of embedded system. Classifications, applications and purpose of embedded systems.

15Hours

REFERNCE BOOKS:

1. The 8051 Microcontroller Architecture, Programming and applications by- Kenneth Ayala
2. Programming and Customizing, The 8051 Microcontroller by-MykePredko
3.PIC Micro controller and Embedded System by Mazid Muhammad

Practical, Elective III

Paper Code: ELEDSEP6.2A **Paper Title:** Mini Project

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

ELE-6.2A PROJECT WORK

1. Students in a group, not exceeding **THREE**, should design, fabricate and assemble ONE Electronic project in their respective colleges. The department faculty is required to guide the project work.

2. Each student should prepare a report and submit the report at the time of the practical examination duly certified by the concerned faculty guide & HOD.

3. Department faculty shall ensure that the entire project work is carried out in their respective colleges by utilising the practical classes assigned to practical VIII. A seminar on the project work is compulsory.

Sixth Semester B.Sc. (Electronics) Elective IV

Paper Code: ELEDSET6.2B **Paper Title:**Microcontroller & Mat lab
Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20
Total hours:60 **No of credits :**3

Unit I: Introduction to Microcontrollers

- Basic block diagram, comparison of microcontroller with microprocessors, comparison of 8-bit, 16 bit and 32-bit microcontrollers.
- Overview of 8051 series–comparison of 8051, 8052, 8031.
- Other Microcontroller families (Mention only) – Maxim 89C420, 89C440, 89C450
- Atmel Corporation AT89C51, AT 89LV51, AT89C1051, AT89C2051, AT89C52.
- **MICROCONTROLLER 8051**- architecture -internal block diagram, key features of 8051, pin diagram, memory organization, Internal RAM memory, Internal ROM. General purpose data memory, special purpose/function registers, external memory.
- **Counters and timers** – 8051 oscillator and clock, program counter, TCON, TMOD, timer counter interrupts, timer modes of operation. Input / output ports and circuits/ configurations, serial data input / output – SCON, PCON, serial data transmission modes.

15Hours

Unit II:8051- Interrupts, Addressing modes and Instruction set

- **Interrupts** – IE, IP, time flag interrupts, serial port interrupt, external interrupts, reset, interrupt control, interrupt priority, interrupt destinations & software generated interrupts.
- **Addressing modes**–immediate addressing, register addressing, direct and indirect addressing,
- **Data transfer instructions** – internal data move, external data move, code memory read-only data move, Push and Pop and data exchange instructions.
- **Logical Instructions** – byte level logical operations, bit level logical operations, rotate and swap operations.
- **Arithmetic Instructions** – flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic, simple programs in assembly language.

15Hours

Unit III:8051-Programming & Interrupts

- **Programming:** Assembler directives, Assembly language programs-Addition of two 8-bit numbers Subtraction of two 8-bit numbers, Multiplication of two 8-bit numbers, Division of two 8-bit numbers. Largest and smallest of an array, Arranging an array of numbers in ascending order and descending order.
- **Interrupts:** Basics of interrupts, Classification of interrupts-Maskable, Non maskable, Vectored, Non vectored interrupts, Interrupts structure, Interrupt control, Interrupt Priority and Interrupt Destinations.

15Hours

Unit – IV: MATLAB

Meaning and Scope of Computational Physics, Programming Concepts, Preliminaries of Programming (Problem Definition and Solution, Algorithms &Flow charts).
MATLAB: Introduction, Basics of MATLAB, Variables & Arrays, Various Matrixoperations, displaying output data, Data files, scalar and Array operations, Plotting operations. Implementation. Problems

15Hours

REFERNCE BOOKS:

1.The 8051 Microcontroller Architecture, Programming and applications by- Kenneth Ayala
2.Programming and Customizing, The 8051 Microcontroller by-MykePredko
3.PIC Micro controller and Embedded System by Mazid Muhammad
4.MATLAB-Rudrapratap (Oxford University press)
5.MATLAB Programming by Kirani Singh, B.B. Chaudhuri PHI

Practical, Elective IV

Paper Code: ELEDSEP6.2B **Paper Title:** Mini Project

Teaching Hours: 3 Hrs / Week **Marks:** Th-40+IA-10

Credits :1

1. Students in a group, not exceeding **THREE**, should design, fabricate and assemble ONE Electronic project in their respective colleges. The department faculty is required to guide the project work.

2. Each student should prepare a report and submit the report at the time of the practical examination duly certified by the concerned faculty guide & HOD.

3. Department faculty shall ensure that the entire project work is carried out in their respective colleges by utilising the practical classes assigned to practical VIII. A seminar on the project work is compulsory.

Sixth Semester B.Sc. (Electronics) Skill Enhancement Course

Paper Code: ELEDSCT 6.3 **Paper Title:** Electrical Circuits And Network Skills

Teaching Hours: 4Hrs / Week **Marks:** Th-80+IA-20

Total hours:30 **Credits:2**

The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode.

Unit I:

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

3 Hours

- **Electrical Circuits**: Basic electric circuit elements and their combination. Rules to analyse DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Singlephase and three-phase alternating current sources. Rules to analyse AC sourced electrical circuits. Real, imaginary and complex power components of ACsource. Power factor. Saving energy and money.

4 Hours

- **Electrical Drawing and Symbols**: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop.

4 Hours

- **Generators and Transformers**: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers.

3 Hours

Unit II:

- **Electric Motors**: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or ACsources to control heaters & motors. Speed & power of ac motor.

4 Hours

- **Solid-State Devices**: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources.

3 Hours

- **Electrical Protection**: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Relay protection device.

4 Hours

- **Electrical Wiring**: Different types of conductors and cables. Basics of wiring-Star and delta connect -ion. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays.
- **Splices:** wire nuts, crimps, terminal blocks, and solder. Preparation of extension board.

5 Hours

REFERNCE 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.

Question Paper pattern
First Semester B.Sc. Degree Examination, December 2020
(CBCS Scheme-2020-21: Regular)
ELECTRONICS
ELEDSC T11:NETWORK ANALYSIS AND ANALOG ELECTRONICS

Time: 3 hours Max. Marks: 80

1.		**Answer any 10 sub question**	**10 x 2 = 20**
	i.		
	ii.		
	iii.		
	iv.		
	v.		
	vi.		
	vii.		
	viii.		
	ix.		
	x.		
	xi.		
	xii.		
2.			
	(a)		5 marks
	(b)		10 marks
		OR	
3.	(a)		5 marks
	(b)		10 marks
4	(a)		5 marks
	(b)		10 marks
		OR	
5	(a)		5 marks
	(b)		10 marks
6.	(a)		5 marks
	(b)		10 marks
		OR	
7.	(a)		5 marks
	(b)		10 marks

8.	(a)	5 marks
	(b)	10 marks
	OR	
9.	(a)	5 marks
	(b)	10 marks

****

Instruction to set the question paper.

1. Question number 1 has 12 sub questions consisting of 3 questions from each unit. Each question carries two marks. Student has to answer any ten questions.
2. Question number 2 and 3 are from unit I.
3. Question number 4 and 5 are from unit II.
4. Question number 6 and 7 are from unit III
5. Question number 8 and 9 are from unit IV.
6. Student has to answer either question number 2 or 3, 4 or 5, 6 or 7 and 8 or 9.
   Note: In case student answered both the questions from the same unit in full or part, highest marks from any one choice has to be considered.

Question paper pattern for skill enhancement course, SEC

Third Semester B.Sc. Degree Examination, December 2021
(CBCS Scheme-2020-21: Regular)
ELECTRONICS
ELESEC T32:Skill Enhancement Course

Time: 2 hours Max. Marks: 40

1.		**Answer any 5 sub question**	**5 x 2 = 10**
	i.		
	ii.		
	iii.		
	iv.		
	v.		
	vi.		
2.			
	(a)		5 marks
	(b)		10 marks
		OR	
3.	(a)		5 marks
	(b)		10 marks
4	(a)		5 marks
	(b)		10 marks
		OR	
5	(a)		5 marks
	(b)		10 marks

Instruction to set the question paper.

7. Question number 1 has 6 sub questions consisting of 3 questions from each unit. Each question carries two marks. Student has to answer any five questions.
8. Question number 2 and 3 is from unit I.
9. Question number 4 and 5 is from unit II.
10. Student has to answer either question number 2 or 3, 4 or 5.
    Note: In case student answered both the question from the same unit in full or part, highest marks from any one choice has to be considered.