Dnyanopasak Shikshan Mandal's

College of Arts, Commerce and Science, Parbhani

Department of Electronics

Courses offered at UG level (B. Sc.)

Program : **B. Sc. with Electronics as 1 of the 3 optional subjects**

Program Outcomes:

The learners can be employed as Electronic Instrument operator, Electronic Circuit Designer, Electronic Consultant, can be an Entrepreneur, or may pursue higher studies in Electronics to work as a Teacher at College or University level. Knowledge of fundamental Electronic Science, basic electronic components, semiconductor devices, basic digital technologies, and communication technologies. Application of knowledge, problem analysis, investigation of problems, use of modern tools and instruments, Environmental awareness, ethics, individual and team work, communication, and lifelong learning.

Program specific Outcomes:

- In-depth knowledge of basic concepts of electronic science, basic electronic components
- Confidence in identifying various components for specific work/circuit/project etc. and in handling of laboratory instruments for measurements. Analytical abilities.
- Understanding semiconductor devices' characteristics, data converters, data processors, and use of analogue and Digital ICs.
- Understanding working of frequently required circuits in electronics industry; such as amplifiers, oscillators, multivibrators, microprocessors, microcontrolers and their interfacing.
- Fundamentals of Communication Electronics and Power Electronics.
- Confidence building through practical skills with lot of hands on practice.

Program: BSc FY **Course Code**: CCEI-A

Paper Title: Basic Electronics and Network Analysis **Name of Teacher: Shaikh Mugair**

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	Unit I: Basic Circuit Analysis	Ohm's law, KCL, KVL, sign conventions for IR drops and EMFs, series circuits:- proportional voltage formula, voltage divider, open and short in series circuit, parallel circuits:- proportional current formula, open and short in parallel circuit.	Understanding different components.
II	Unit II: Network Theorems	Ideal constant-voltage source, ideal constant-current source, super position theorem, Thevenin theorem, Norton theorem, maximum power transfer theorem.	Understand how to simplify ciruits
III	Unit III: Phasor Algebra	Symbolic notation, significance of operator j, conjugate complex number, various forms of vector representations, arithmetic operations of vectors, powers and roots of vector quantity.	Design algorithms to solve different problems.
IV	Unit IV: AC Fundamentals	Types of ac waveforms, cycle, time period, frequency, amplitude of ac voltage/current, characteristics of sine wave, different values of sinusoidal voltage/current, phase of ac, phase difference, vector representation of an ac quantity, R-L circuit, R-C circuit, series R-L-C circuit, resonance in series R-L-C circuit, resonance curve, bandwidth and Q-factor of series resonant circuit, parallel resonance, resonance curve, Q-factor, band width of parallel resonant circuit. Transformer and its working.	Understanding circuits and its working.

Specify Course Outcome:

1. Student will be able to design algorithms to solve different problems
2. Student will understand how to solve problems using circuit analysis.

Specify Program Outcome:

After completion of this course students will be –

- **able to identify variety of electronic components viz. resistors, inductors capacitors and their types & uses.**
- **able to understand I-V characteristics of basic electronic components.**
- **able to apply network theorems to simplify given network.**
- **able to distinguish between DC/AC sources, relate various characteristics of sinusoidal voltage and understand use of resonant circuits.**

Signature of Teacher

Program: BSC FY **Paper Title: Basic Digital Electronics P:II** **Course Code: CCEI-B**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Number Systems and Codes**	Decimal, Binary Octal and Hexadecimal number systems, inter conversions of number systems, Binary arithmetic (addition, subtraction, multiplication, division), 1's compliment, 2's compliment, binary subtraction using 1's and 2's compliments, Codes: BCD, Gray code, Conversion of BCD to Binary, Binary to Gray code and vice versa, ASCII code	Perform inter conversion of number systems, binary arithmetic and inter conversion of codes
II	**Logic Gates**	Positive logic, Negative logic, Definition, symbol and truth table of NOT, OR, AND, NOR, EX-OR, EX-NOR gates. De-Morgan's theorem, Universal properties of NAND and NOR gates, bubbled OR gate, bubbled AND gate, gate propagation delay time, power dissipation	Identify different types of Logic Gates along with their properties
III	**Boolean Algebra and K-Map**	Boolean operations, logic expressions, rules and laws of Boolean algebra, Simplification of Boolean expression, SOP & POS form of Boolean expressions for logic network minterms, maxterms, Simplification of Boolean expression using K-map up to 4 variables for SOP.	Simplify Boolean Expression
IV	**Arithmetic Circuits**	Half Adder, full adder, realization of half and full adder using gates, parallel binary adder, half and full subtractor.	Construct Arithmetic Circuits

Program: BSC FY **Paper: Digital Logic Circuits P:IV** **Course Code: CCE-IIB**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Data Processing Circuits**	Introduction to multiplexers, designing of 2:1 MUX, 4:1 MUX, and 8:1 MUX, introduction to demultiplexers, designing of 2:1 DMUX, 4:1 DMUX, and 8:1 DMUX, Encoders: decimal to BCD encoder, priority encoder, Decoders: BCD to decimal decoder, BCD to seven segment decoder.	Construct Data Processing circuits
II	**Flip- Flops**	1-bit memory cell, S-R flip-flop, clocked S-R flip-flop, preset and clear facility in flip–flop, J–K flipflop, race around condition, master-slave JK Flip Flop, D-type and T-type flip flop.	Identify and use different types of Flip Flops
III	**Sequential logic circuit**	Concept of counters, types of counters, modulo of counter, 2-bit, 3-bit and 4-bitasynchronous counters, 2-bit, 3-bit and 4-bit synchronous counters, mod-5counter, decade counter using IC 7490, ring counter, shift registers: SISO, SIPO, PISO, PIPO.	Construct sequential logic circuits
IV	**Data Converters**	D to A converters: R-2R Ladder DAC, characteristics of DAC, resolution, linearity, accuracy, settling time. A to D converters: parallel comparator ADC, successive approximation ADC, Characteristics of ADC: resolution, conversion time, quantization error	Construct Data Converter Circuits

Program: BSC SY **Paper Title: Amplifiers (P-VI)** **Course Code: CCE III (Section A)**
Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Transistor Biasing**	DC Load line, Q-Point and Maximum Undistorted Output, Need for Biasing a Transistor, Factors Affecting Bias Variations, Stability factor, Beta Sensitivity, Stability Factor for CB and CE Circuits, Base Bias with Emitter Feedback, Base Bias with Collector Feedback, Base Bias with Collector and Emitter Feedback, Voltage Divider Bias (Numerical Problems)	Identify different Biasing circuits along with their parameters
II	**Signal Amplifiers**	h-parameters, An equivalent circuit for the BJT, Transconductance Model, Analysis of CE Amplifier, CB Amplifier, CC Amplifier using h-parameters (Numerical Problems)	Construct different configurations of Transistor Amplifier
III	**Operational Amplifier**	Theory of Differential Amplifier, Block Diagram of Op-Amp, Schematic Symbol, Ideal Characteristics, Input Offset Voltage, Input Offset Current, Input Bias Current, Input Impedance, Output Impedance, Open Loop Gain, CMRR, SlewRate, Inverting Amplifier, Non-inverting Amplifier, NumericalProblems	Identify and List different Parameters of Operational Amplifier
IV	**Applications of OpAmp**	Op-Amp as Adder, Op-amp as Subtractor, OpAmp as Integrator, Op-Amp as Differentiator, Op-Amp as Comparator, Op-Amp as Schmitt's Trigger, Solving Differential Equation, voltage to current converter and current to voltage converter, Numerical Problems	Construct Arithmetic Circuits Using OP-Amp

Program: BSC SY

Paper Title: Oscillators and Multivibrators (P-VIII)

Course Code: CCE IV (Section A)

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Feedback Principles**	Concept of positive and negative feedback, advantages and disadvantages of negative feedback, gain stability, increased bandwidth, decreased distortion, decreased noise. (Numerical Examples)	Construct feedback circuits
II	**Sine Wave Oscillators**	Introduction to Positive and Negative Feedback, Requirement of an Oscillator, Barkhausen Criterion, Hartley Oscillator, Colpitt's Oscillator, R-C Network, Phase Shift Oscillator, Wien Bridge Oscillator (Circuit diagram, Working, Expression of Frequency and Condition for Oscillations) (Numerical Problems)	Identify and Classify Oscillators
III	**Multivibrators**	Transistor as a Switch, Transistorized Astable Multivibrator, Transistorized Monostable Multivibrator, Transistorized Bistable Multivibrator (working and waveforms), Schmitts trigger, Block Diagram of IC555, IC555 as Monostable Multivibrator	Construct Multi-Vibrator and Sweep Circuits
IV	**Time base circuits**	Introduction, types of time base circuits, methods of generating time base waveforms, exponential sweep circuit, sweep circuit using transistor switch, sweep circuit using UJT, transistor constant current sweep, Miller sweep circuit, bootstrap sweep circuit. (Numerical Examples)	Construct time base circuits

Program: BSC SY

Paper Title P-X: Practical's based on P-VI & P-VIII **Course Code: CCEP II**
Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics/Experiment	Unit-wise Outcome
I	**Group I**	1. Design voltage divider bias circuit for CE amplifier with centred-Q. Measure it gain at 2 KHz frequency signal. 2. Design single stage C-E amplifier with gain A = 20. Study its frequency response. 3. Design and study Emitter follower (CC amplifier) circuit and determine its output impedance. 4. Design and study inverting amplifier using Op-Amp. 5. Design and study non-inverting amplifier using Op-Amp. 6. Study frequency response of Op-Amp inverting/non-inverting amplifier. 7. Study OP-Amp as an Adder. 8. Study OP-Amp as an Integrator. 9. Study OP-Amp as Schmitt's Trigger 10. Study OP-Amp as Subtractor.	Draw circuit diagram, Construct the circuit and record input and output voltages
II	**Group II**	1. Construct and study transistorised Hartley oscillator. 2. Construct and study transistorised Colpitt's oscillator. 3. Construct and study transistorised Phase shift oscillator.	Draw circuit diagram, Construct the circuit and record input and output waveforms

		4. Construct and test Wein bridge oscillator using Op-Amp. 5. Design and build transistorised astable mutivibrator of given pulse width and space width. 6. Design and study transistorised monostable mutivibrator of given gate width. 7. Construct and study transistorised bistable mutivibrator. Use manual triggering to test. 8. Design and build transistorised monostable mutivibrator using IC 555. Measure its gate width. 9. Construct and study UJT time base circuit. 10. Construct and study constant current ramp generator. Measure its rise time and fall time	

Program: BSC SY

Paper Title: P-XI -Practical Based On Papers VII And IX **Course Code: CCEP III**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics/Experiment	Unit-wise Outcome
I	**Group I** **Microprocessor Intel 8085**	1. ALP for addition of two bytes, result 8-bit. 2. ALP for addition of two bytes, result 16-bit. 3. ALP for subtraction of two bytes. 4. ALP to find 2's complement of 8-bit and 16-bit numbers 5. ALP for masking off: a) Four LSBs of given 8-bit number. b) Four MSBs of given 8-bit number. 6. ALP to transfer a block of data. 7. ALP to find sum of a series of 8-bit numbers. 8. ALP to find smallest/largest number of a given series. 9. ALP to generate square wave using IC 8255	Draw Flow Chart, write Assembly Language Program, and Execute it using Microprocessor Trainer Kit
II	**Group II : For Microcontroller Intel 8051**	1. ALP to add two 8-bit numbers. 2. ALP to add two 16-bit numbers. 3. ALP to subtract two 8-bit numbers. 4. ALP to multiply two 8-bit numbers. 5. ALP to divide two 8-bit numbers.	Draw Flow Chart, write Assembly Language Program, and Execute it using Microcontroller Trainer Kit

		6. ALP to find 2's complement of an 8-bit number. 7. ALP to find 1's complement of a 16-bit number. 8. ALP to logically AND/OR/XOR two 8-bitnumbers. 9. ALP to convert an 8-bit Binary number to Gray. 10. ALP to convert an 8-bit Gray number to Binary. 11. ALP to determine sum of a series of 8-bit numbers. 12. ALP to move a block of data	

Program: BSC SY

Paper Title: Electronics Lab Skill SEC **Course Code: CCESI (Section A)**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Study of Basic Components**	Study of resistor, capacitor, inductor, thermistor and LDR	Identify and measure values various components
II	**Meters & Instruments**	Analog multimeter: Front panel, functions, various ranges, sensitivity and handling precautions. Signal Generators: Front panel controls, functions, features, output impedance and handling precautions. CRO: Front panel controls, functions, features, maximum frequency limit, minimum and maximum voltage measurements and handling precautions. Digital LCR meter: Front panel controls, functions, features or ranges and handling precautions.	Measure resistance, voltage using analog meter Measure time period, frequency using CRO and digital LCR meter

Program: BSC TY

Paper Title: Communication Electronics-I (P-XII) **Course Code: DECE-I (Section A)**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Basics of Communication Systems**	Introduction, Block diagram of Communication System, Classification of Communication Systems: Direction, Nature of signal and Technique of transmission, Need for Modulation, Types of Modulation, Bandwidth. (Numerical Problems)	Classify modulation and Communication System
II	**Amplitude Modulation**	Amplitude Modulation Theory, Mathematical representation of AM wave, Modulation index, Frequency spectrum of AM wave, Bandwidth of AM, Power relations in AM wave, AM circuits: Basic circuit for BJT Collector modulation, Amplitude demodulator circuit. (Numerical Problems)	Illustrate Amplitude Modulation
III	**Frequency Modulation**	Theory of Frequency modulation, Mathematical Representation of FM wave, Band width,Generation of FM, Direct method for FM generation, Transistor reactance modulator, Varactor reactance modulator. (Numerical Problems)	Illustrate Frequency Modulation
IV	**Pulse Modulation**	Introduction, Classification of Pulse modulation systems, Sampling theorem, Nyquist criteria, Basic principles of Pulse-Amplitude modulation (PAM), Pulse-Width modulation(PWM), Pulse-Position modulation (PPM),Generation and detection of PAM only, Digital pulse modulation: Pulse-Code modulation (PCM) PCM transmitter, PCM receiver and quantization process, quantization error, application, advantages and disadvantages of PCM. (Numerical Problems)	Illustrate Pulse Modulation

Program: BSC TY

Paper Title: Communication Electronics-II (P-XIV) **Course Code: DECE-II (Section A)**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Radio Receivers**	Introduction, Basic block diagram of communication receiver, Tuned Radio Frequency (TRF) Receiver, Super Heterodyne Receiver, Characteristics of Radio receivers, Sensitivity, Selectivity, Fidelity, Image frequency and its rejection, Double spotting. (Numerical Problems)	Illustrate Radio Receiver and its characteristics
II	**Microwaves & Radar Systems**	Introduction to microwave properties and applications of microwaves, Basic principles of radar system, Block diagram of basic pulsed radar system, Radar range equation, Moving target indication, CW Doppler radar. (Numerical Problems)	Identify properties of microwaves and Radar System
III	**Introduction to Mobile Communication**	Historical perspectives, Cellular Systems, Third Generation (3G) Systems, Fourth-Generation (4G) Systems.	Illustrate Generations of Mobile Communication
IV	**Introduction to Optical Fibres**	Fibre Optics, Structure of Optical Fibres, Classification of Optical Fibres, Propagation of Light, Refraction and Snell's law, Total Internal Reflection, Light Propagation through an Optical Fibre, Acceptance Angle and Numerical Aperture, Dispersion, Intermodal Dispersion, Fibre Characteristics, Fibre Losses, Calculation of Losses, Choice of Wavelength, Fibre Optic Communications, Applications of Fibre Optic Communication, Advantages of Optic Fibres, Disadvantages of Optic Fibres.(Numerical Problems)	Illustrate Fibre Optic Communication

Program : BSC TY

Paper Title: Digital Logic Design (DLD) **Course Code:SEC-IV(A)**

Name of Teacher: P.B. KHANALE

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	**Combinational and Sequential Logic Design**	Combinational Logic Design: Overview of Logic Gates and Boolean Algebra, Forms of logic representation: SOP form, POS form, Truth table, Minterm form, Maxterm form, Logic diagram and their interconversions, Methods Logic Implementation: AOI, NAND, and NOR and their interconversions, Techniques of Minimization of Logic Expressions: K-Map Technique, QuineMcCluskey method, Exercises of Combinational logic Design. Sequential Logic Design: Overview of Flip flops, Counters and Shift registers, Exercises of Sequential logic Design	Convert one form of logic into other forms Convert AOI implementation into NAND implementation Convert AOI implementation into NOR implementation Minimize a logic expression using K-Map techniques
II	**Programmable Logic Devices (PLDs)**	Introduction, Simple PLDs (SPLDs), Programmable Logic Array (PLA), Programmable Array Logic (PAL), Generic Array Logic (GAL), Complex PLDs (CPLDs), Field Programmable Gate Arrays (FPGAs)	Implement PLA and PAL