Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, Karad.

(An Empowered Autonomous College)

Department of Electronics

B. Sc. II Course Structure NEP 2024

(W. E. F. June 2025)

Year	Semester	Course Type	Course Code	Course Title	Credits
B. Sc. II	III	Major - V	MJBET24-301	Analog Communication	02
		Major -VI	MJBET24-302	Wave Shaping Circuits & Operational Amplifier	02
		Major Practical -III	MJBEP24-303	Practical Based on Major Papers	02
		Minor - V	MNBET24-301	Linear Integrated Circuits	02
		Minor -VI	MNBET24-302	Microprocessor 8085	02
		Minor Practical -III	MNBEP24-303	Practical Based on Minor Papers	02
		OE-III	OEELE24-301	Practical	02
		VSC-I	VSCI-EP24-301	Practical	02
		SEC-I	SECI-EP24-301	Practical	02
		AEC-I	AECI-24-301	English	02
		CC-I	CCI-24-301	Co-curricular Course	02
	IV	Major - VII	MJBET24-401	Digital Communication	02
		Major -VIII	MJBET24-402	8085 Microprocessor & 8051 Microcontroller	02
		Major Practical -IV	MJBEP24-403	Practical Based on Major Papers	02
		Minor - VII	MNBET24-401	Linear & Non-linear Circuits	02
		Minor -VIII	MNBET24-402	Communication Systems	02
		Minor Practical -IV	MNBEP24-403	Practical Based on Minor Papers	02
		OE-IV	OEELE24-401	Practical	02
		SEC-II	SECII-EP24-401	Practical	02
		AEC-II	AECII-24-401	English	02
		VECII	VECES-24-401	Environmental Studies	02
		CEP-I	CEPI24-401	Community Engagement Programme-I	02
				Total	**44**

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Department of Electronics

Course Structure & Evaluation Pattern: B. Sc. II Electronics

(w.e.f.June 2025)

Sem.	Paper Code	Credits	Title of Paper	Evaluation Scheme (Marks)			Grand Total Marks
				CCE	SEE	Total	
III	MJ-BET24-301	02	Analog Communication	10	40	50	550
	MJ-BET24-302	02	Wave Shaping Circuits & Operational Amplifier	10	40	50	
	MJ-BEP24-303	02	Practical Based on Major Papers	--	50	50	
	MN-BET24-301	02	Linear Integrated Circuits	10	40	50	
	MN-BET24-302	02	Microprocessor 8085	10	40	50	
	MN-BEP24-303	02	Practical Based on Minor Papers	--	50	50	
	OEELE24-301	02	Practical	--	50	50	
	VSCI-EP24-301	02	Practical	--	50	50	
	SECI-EP24-301	02	Practical	--	50	50	
	AECI-24-301	02	English	10	40	50	
	CCI-24-301	02	Co-curricular Course	--	50	50	
IV	MJ-BET24-401	02	Digital Communication	10	40	50	550
	MJ-BET24-402	02	8085 Microprocessor & 8051 Microcontroller	10	40	50	
	MJ-BEP24-403	02	Practical Based on Major Papers	--	50	50	
	MN-BET24-401	02	Linear & Non-linear Circuits	10	40	50	
	MN-BET24-402	02	Communication Systems	10	40	50	
	MN-BZP24-403	02	Practical Based on Minor Papers	--	50	50	
	OEELE24-401	02	Practical	--	50	50	
	SECII-EP24-401	02	Practical	--	50	50	
	AECII-24-401	02	English	10	40	50	
	VECES-24-401	02	Environmental Studies	--	50	50	
	CEPI24-401	02	Community Engagement Programme-I	--	50	50	
Total		**44**			**Total**		**1100**

Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, Karad.

(An Autonomous College)

Department of Electronics

Syllabus for **Bachelor of Science Major (Electronics)** Part II

1. **SUBJECT: Electronics**
2. **YEAR OF IMPLEMENTATION:** New Syllabi for the B.Sc. II Electronics will be implemented from **June 2025** onwards.
3. **STRUCTURE OF COURSE:** THIRD SEMESTER

Sr. No.	SUBJECT TITLE	Theory			Practical		
		Paper No. & Paper Code	No. of lectures Per week	Credits	Practical	No. of lectures Per week	Credits
1	Electronics	Paper-V: (MJ-BET24-301)	4	4	(MJ-BEP24-303)	4	2
		Paper-VI: (MJ-BET24-302)					

FORTH SEMESTER

Sr. No.	SUBJECT TITLE	Theory			Practical		
		Paper No. & Paper Code	No. of lectures Per week	Credits	Practical	No. of lectures Per week	Credits
1	Electronics	Paper-VII: (MJ-BET24-401)	4	4	(MJ-BEP24-403)	4	2
		Paper-VIII: (MJ-BET24-402)					

Structure and Title of Papers of B. Sc. II Course:

B. Sc. II Semester III

Paper V: Analog Communication

Paper VI: Wave Shaping Circuits and Operational Amplifier

B. Sc. II Semester IV

Paper VII: Digital Communication

Paper VIII: 8085 microprocessor and 8051 microcontroller

Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, Karad.

(An Autonomous College)

Syllabus Introduced from June, 2024.

B.Sc. Part II: **Electronics**

Semester III Credit (4)

Paper V: MJ-BET24-301: Analog Communication (30)

Learning Objectives:

1. To learn basics of electronic communication system: need, development and Advantages
2. To study various types of modulation and demodulation techniques.
3. To understand working of Transmitters and Receivers.
4. To get familiarize with Pulse Modulation techniques

Unit I: Electronic Communication **(6)**

Introduction to communication – means and modes, Brief idea of frequency allocation for radio communication system in India (TRAI), Electromagnetic communication spectrum, band designations, usage and applications, Channels and base-band signals.

Block diagram of an electronic communication system, need for modulation, concept of channels and base-band signals. Concept of Noise, Types of Noise, Signal to noise ratio, Noise Figure, Noise Temperature, Friss formula

Unit II: Amplitude Modulation **(10)**

Amplitude Modulation, modulation index and frequency spectrum, Generation of AM, Amplitude Demodulation (diode detector), Concept of Double side band suppressed carrier, Single side band suppressed carrier, other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation, Independent Side Band Modulation). Block diagram of AM Transmitter and Receiver

Unit III: Angle Modulation **(8)**

Frequency and Phase modulation, frequency spectrum diagram equivalence between FM and PM, bandwidth requirements, frequency deviation and carrier swing, Generation of FM (direct and indirect methods FM generator-Varactor diode modulator.

FM detector: principle, PLL, slope detector circuit, principle of working and waveforms. Qualitative idea of Super heterodyne receiver, Block diagram of FM transmitter and Receiver. Comparison between AM, FM and PM

Unit IV: Analog Pulse Modulation **(6)**

Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM modulation, Detection technique for PAM only, Multiplexing. Introduction to pulse and digital communications, digital radio, advantages and applications of PAM, PWM, PPM.

□ Learning Outcomes:

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

1) Avail the skill of design and development of Modulation and Demodulation.
2) Implement the circuits of AM, FM, PM Modulators.
3) Design and build applications of PAM, PWM, PPM, PCM.
4) Understand the communication systems.

□ Reference Books:

1. Electronic Communication Systems: Fundamentals through Advanced, W. Tomasi, Pearson Education, 3rd Edition (Unit I, II, III, IV)
2. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India. (Unit II, III, IV)
3. Modern Digital and Analog Communication systems- B. P. Lathi, 4rd Edition 2009Oxford University press.(Unit II, III, IV)
4. Principles of Electronic Communication Systems, Frenzel,3rd edition, McGraw Hill, (Unit II, III)

5. Communication Systems, S. Haykin, 2006, Wiley India (Unit IV)
6. Electronic Communication Systems, G. Kennedy, 3rd Edn, 1999, Tata McGraw Hill.
7. Electronic Communication System, Blake, Cengage, 5th edition.

Semester III

Paper VI: MJ-BET24-302: Wave Shaping Circuits and Operational Amplifier (30)

□ **Learning Objectives:**

1. To learn wave shaping circuits and its Advantages in electronics systems
2. To study various types of modulation and demodulation techniques.
3. To understand working of Transmitters and Receivers.
4. To get familiarize with Pulse Modulation techniques

Unit I: Linear and nonlinear wave shaping circuits **(8)**

Linear Wave Shaping: High pass, low pass RC circuits-response to sinusoidal, step, pulse, square and ramp inputs. RC circuit as differentiator and integrator.

Nonlinear wave shaping: Diode clippers, Clipping, Clamping Circuits: Basic operation of diode clamper with waveform Transistor clipper, clippers at two independent levels-transfer characteristics of clippers-emitter coupled clipper, clamping operation diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input

Time base Circuits: Voltage time base generators: General feature of Time Base Signals, Sweep circuits using transistor and UJT, Constant – Current Sweep generator (Miller integrator) Current Time Base Generators.

Unit II: Multivibrator **(8)**

BJT as a switch, **Astable Multivibrator:** Collector coupled astable multivibrator, circuit operation, Study of waveform, Expression for output frequency, Duty cycle.

Monostable Multivibrator: Collector coupled monostable multivibrator, circuit operation, study of wave forms, Expression for gate width,

Bistable Multivibrator: Collector coupled bistable multivibrator, circuit operation, study of wave forms, Schmitt Trigger: Circuit operation and applications

Design of long duration time period using 555, 555 timer as variable duty cycle (10% to 90%)

Unit III: Differential Amplifier **(6)**

Transistor dc amplifier, Differential amplifier, Emitter coupled differential amplifier, Operations, characteristics and parameters (Input Impedance, Output Impedance, Common Mode and Differential Mode Gain, CMRR), AC and DC analysis for dual inputs and single ended output, Constant Current Bias and Current Mirror Bias

Unit IV: Operational Amplifier **(8)**

Introduction to Op-Amp, Block diagram of typical Op-Amp, Offset error voltages and currents, offset balancing techniques, Effect of temperature on offset voltages, currents and CMRR, Slew Rate, Frequency response of Op-Amp. Study of IC 741 and Comparative study of ICs LM324, LM308, LF 356

□ **Learning Outcomes:**

Student should able to:

1) Design various wave shaping circuits for different applications
2) Design and build transistor and IC555 based multivibrator for various applications
3) Make AC and DC analysis of differential amplifier
4) Study of op amp IC 741 characteristics

Reference Books:

1. Op-amp and Linear Integrated Circuits-Ramakant Gaikwad (Unit III, IV)
2. A Text Book of Applied Electronics-R. S. Sedha (S. Chand & Co) (Unit I, II)
3. Linear Integrated Circuits-D Roy Choudhari(Unit IV)
4. Op-Amp with Linear integrated circuits-William D Stanley(Pearson) (Unit III)
5. Basic Electronics- Bernard Grob (Unit III),

6. Electronics Devices and Circuits:An Introduction- Allen Mottershed (Unit II)
7. A Course in Circuit Analysis- Soni and Gupta
8. Linear Circuits- M. E. Valkenburg an Kinariwala

Semester III Practical III
MJ-BEP24-303 Credit (2)
Analog Communication, Wave Shaping Circuits and Operational Amplifier Lab
(Hardware and Circuit Simulation Software)

□ **Course Objectives:**

1. To study modulation and demodulation circuits.
2. To understand working of Transmitters and Receivers.
3. To get familiarize with Pulse Modulation circuits
4. To learn the computer architecture and basic programming concepts.
5. To learn different wave shaping circuits and their applications.

GROUP A

1. Study of Amplitude Modulator and demodulator using Transistor
2. Study of FM – Modulator and Demodulator circuit
3. Study of Phase modulation Circuits
4. Study Pulse Amplitude Modulation (PAM)
5. Study Pulse Width Modulation (PWM)
6. Study Pulse Position Modulation (PPM)
7. Study of Pulse Code Modulation (PCM)
8. Study of RF tuned amplifier

GROUP B

1. Study of RC integrator and Differentiator
2. Study of clipping and clamping circuits.
3. Study of UJT as a sweep generator
4. Study of Miller integrator
5. To design transistorized astable multivibrator
6. To design transistorized bistable multivibrator
7. Study of IC 555 as mono stable mult-vibrator. (measure long time period using LED)
8. Study of Schmitt trigger
9. Study of op amp characteristics I
10. Study of op amp characteristics II

□ **Learning Outcomes:**

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

1) Design various wave shaping circuits for different applications
2) Study of op amp IC 741 characteristics.
3) Design the modulators, demodulators for amplitude and frequency modulated systems and analyze in time and frequency domain.
4) Compare analog communication systems on the basis of bandwidth, power requirement and the performance in the presence of noise.
5) Study the Pulse modulators, demodulators for progressive communication systems.

Semester IV Credit (4)

Paper VII: MJ-BET24-401: Digital Communication (30)

Learning Objectives:

1. To learn basic concepts of digital modulation techniques
2. To learn advanced digital modulation techniques
3. To study various cellular communication techniques.
4. To understand working of satellite communication system and other wireless techniques.

Unit I: Digital Modulation Techniques **(7)**

Need for digital transmission, Concept of Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), and Binary Phase Shift Keying (BPSK), 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, TDM, FDM concepts, comparison of TDM and FDM

Unit II: Advanced Digital Modulation Technique **(8)**

Pulse Code Modulation: Digital Carrier Modulation Techniques, Sampling, Quantizing, Quantization and Encoding, Uniform and Nonuniform Quantization, Quantization Noise, Companding, Coding, Decoding, Regeneration

DPCM, DM, ADM. Binary Line Coding Technique, Multi-level coding, QAM (Modulation and Demodulation)

Unit III: Cellular Communication **(8)**

History of wireless communication, Wireless Generation and Standards, 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, 4G LTE and 5G concepts.

Unit IV: Satellite communication **(7)**

Introduction, need, satellite orbits, advantages and disadvantages of geostationary satellites. Satellite visibility, satellite system – space segment, block diagrams of satellite sub systems, up link, down link, cross link, transponders (C- Band),effect of solar eclipse, path loss, ground station, simplified block diagram of earth station. Satellite access, TDMA, FDMA, CDMA concepts, comparison of TDMA and FDMA, Satellite antenna (parabolic dish antenna), GPS-services like SPS & PPS

□ Learning Outcomes:

At the end of this course, the students should be able to:

1) Make Digital data transmission circuits of ASK,FSK,PSK,PCM.
2) Perform the time and frequency domain analysis of the signals in a digital communication system.
3) Analyze Performance of Satellite and Cellular communication.
4) Understand communication systems design

□ Reference Books:

1. Electronic Communication Systems: Fundamentals through Advanced, W. Tomasi, Pearson Education, 3rdEdition(Unit I, II, III, IV)
2. Principles of Electronic communication systems – Frenzel, 3rdedn, McGraw Hill
3. Martin S. Roden, Analog & Digital Communication Systems, Prentice Hall, Englewood Cliffs, 3rdEdn(Unit I, II, III, IV)
4. Modern digital and analog Communication systems- B. P. Lathi, 4th Edition 2009 Oxford University press. (Unit I, II, III, IV)

5. Telecommunication Switching Systems and Networks, Thiagarajan Vishwanathan, Prentice Hall of India. (Unit I, II, III, IV)
6. Communication Systems, S. Haykin, 2006, Wiley India
7. Wireless Communications Principles and Practice, Theodore S. Rappaport, 2nd Edition, Pearson Education Asia. (Unit I, II, III, IV)
8. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.

Semester IV

Paper VIII: MJ-BET24-402: 8085 microprocessor & 8051 microcontroller (30)

Learning Objectives:

1. To learn the principles of programming
2. To learn ALP for I/O port, timer, counter and interrupt operations
3. To learn the fundamentals of C programming
4. To learn ALP for I/O port, timer, counter and interrupt operations

Unit I: Microcomputer Organization **(10)**

Introduction, Applications, Basic block diagram, Speed, Word size, Memory capacity, Classification of microprocessors (mention of different microprocessors being used)

Review of 8085 microprocessor: Features, Architecture-block diagram, ALU General Purpose registers, register pairs, flags, stack pointer, program counter, types of buses, Multiplexed address and data bus, Memory mapped I/O and I/O mapped I/O, Addressing modes

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, (Study of IC **ADC 0804 and DAC 0808)**

Unit II: Introduction to Microcontrollers **(07)**

Basic block diagram, comparison of microcontroller with microprocessors, comparison of 8 bit, 16 bit and 32 bit microcontrollers

Microcontroller 8051: architecture internal block diagram, key features of 8051, memory organization, Internal RAM memory, Internal ROM, General purpose data memory, special purpose/function registers, pin diagram, clock and reset circuit, minimum connection of 8051, I/O port Handling.

Unit III: Programming 8051 **(07)**

Addressing modes, Instruction Set, simple programs in assembly language: data transfer, delay generation, I/O operations and manipulation, for arithmetic and logic operations, interfacing of LED, switch, relay, opt-coupler, DC motor.

Unit IV: Features of 8051 **(06)**

Timers / Counters:8051 timers, TMOD, TCON registers, timer modes of operation, programming timers 0 and 1 (8 bit and 16 bit mode)

Interrupts: IE, IP, time flag interrupts, Sources of interrupts, enabling and disabling the interrupts, Timer, serial port interrupt, external interrupts, reset, interrupt control, interrupt priority, interrupt destinations & software generated interrupts

Learning Outcomes:

At the end of this course, the students should be able to:

1) Understand architecture of 8085 microprocessor.
2) Understand architecture of 8051 Microcontroller
3) Program to perform I/O port, basic peripherals interfacing operations
4) Program timer/counter, serial communication and interrupt operations

Reference Books:

1. The 8051 Microconroller, Kenneth Ayala, 3rd edition, CENGAGE Learning. (All Units)
2. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M. A. Mazidi, J. G. Mazidi, and R. D. McKinlay, 2nd Ed., 2007, Pearson Education India. (Unit III)

3. Microprocessor Architecture, Programming and Applications with the 8085, Ramesh S. Gaonkar, 3rd edition. (Unit I)
4. Microcontrollers (Theory and Applications), Ajay V. Deshmukh, Tata McGraw Hill. (Unit II, III, IV)
5. An Embedded Software Primer by David E Simon, Addison Wesley (Unit I)
6. Embedded Systems: Design & applications, S.F. Barrett, 2008, Pearson Education India
7. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill
8. Embedded Microcomputer systems: Real time interfacing, J.W. Valvano 2011, Cengage Learning
9. Embedded system Design - Frank Vahid and Tony Givargis, John Wiley, 2002

Semester IV
Practical IV Credit (2)
Digital Communication, 8085 microprocessor and 8051 microcontroller Lab
MJ-BEP24-403 (Hardware and Circuit Simulation Software)

Learning Objectives:

1. To learn the fundamental digital techniques for Communication
2. To understand Digital Communication applications in Satellite and Cellular Communication
3. To learn the principles of programming
4. To learn ALP for I/O port, timer, counter and interrupt operations
5. To learn the fundamentals of C programming

GROUP A

1. Study of Amplitude Shift Keying
2. Study of Phase Shift Keying.
3. Study of Frequency Shift Keying
4. Modulation of LED and detection through Photo detector.
5. Study of 16 QAM modulation and Detection with generation of Constellation Diagram
6. Study of Time Division Multiplexing (TDM)
7. Study of Frequency Division Multiplexing (FDM)
8. Study of DPCM and demodulation.
9. Study of Delta Modulation
10. Study of Adaptive Delta Modulation

GROUP B

1. Arithmetic operations using 8051 microcontroller (Addition and Multiplication)
2. Arithmetic operations using 8051 microcontroller (Subtraction and Division)
3. Stack Operations in 8051 microcontroller
4. Study of timer 0/1 in mode 1 to generate time delay
5. Study of timer 0/1 in mode 2 to generate time delay
6. Study of interfacing of ports of 8051 for O/P : Interfacing of eight LED's. Simulate binary counter (8 bit) on LED's .
6. To interface seven segment display with 8051 microcontroller
7. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
8. Interfacing of DAC

Note : At least one experiments performed using simulation software.

Learning Outcomes:

At the end of this course, the students should be able to:
1. Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.

2. Perform the time and frequency domain analysis of the signals in a digital communication system.
3. Select the blocks in a design of digital communication system.
4. Analyze Performance Satellite and Cellular communication.
5. Understand architecture of 8085 microprocessor.

Nature of Question Paper:

1. **CCE-Paper V & VI : Marks =10:**
   Unit 1, 2, 3: Home Assignment/Unit Test

2. **CCE-Paper VII & VIII: Marks =10:**
   Unit 1, 2, 3: Home Assignment/Unit Test

3. **SEE: Marks =40:**
   Unit 1 to 4:
   Multiple Choice questions (1 X08)
   Attempt any two out of three (2X8=16)
   Attempt any four out of six (4X4=16)

(**CCE**- Comprehensive Continuous Evaluation, **ESE** – End Semester Examination)

Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, Karad.

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Department of Electronics

Syllabus for **Bachelor of Science Minor (Electronics)** Part II

1 SUBJECT: Electronics

2 YEAR OF IMPLEMENTATION: New Syllabi for the B.Sc. II Electronics will be implemented from **June 2025** onwards.

3 STRUCTURE OF COURSE: THIRD SEMESTER

Sr. No.	SUBJECT TITLE	Theory			Practical		
		Paper No. & Paper Code	No. of lectures Per week	Credits	Practical	No. of lectures Per week	Credits
1	Electronics	Paper-V: (MN-BET24-301)	4	4	(MN-BEP24-303)	4	2
		Paper-VI: (MN-BET24-302)					

FORTH SEMESTER

Sr. No.	SUBJECT TITLE	Theory			Practical		
		Paper No. & Paper Code	No. of lectures Per week	Credits	Practical	No. of lectures Per week	Credits
1	Electronics	Paper-VII: (MN-BET24-401)	4	4	(MN-BEP24-403)	4	2
		Paper-VIII: (MN-BET24-402)					

Structure and Title of Papers of B. Sc. II Course:

B. Sc. II Semester III

Paper V: Linear Integrated Circuits

Paper VI: Microprocessor 8085

B. Sc. II Semester IV

Paper VII: Linear & Non-linear Circuits

Paper VIII: Communication Systems

Rayat Shikshan Sanstha's

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Syllabus Introduced from June, 2024.

B.Sc. Part II: **Electronics**

Semester III Credit (4)

Paper V: MN-BET24-301: Linear Integrated Circuits (30)

Learning Objectives:

1. To learn Differential amplifier with frequency response.
2. To learn operational amplifier and their parameters, applications.
3. To study applications of Operational amplifier

Unit I: Differential Amplifier **(06)**

Transistor dc amplifier, Differential amplifier, Emitter coupled differential amplifier, Operations, characteristics and parameters (Input Impedance, Output Impedance, Common Mode and Differential Mode Gain, CMRR), AC and DC analysis for dual inputs and single ended output, Constant Current Bias and Current Mirror Bias

Unit II: Operational Amplifier **(08)**

Introduction to Op-Amp, Block diagram of typical Op-Amp, Offset error voltages and currents, offset balancing techniques, Effect of temperature on offset voltages, currents and CMRR, Slew Rate, Frequency response of Op-Amp. Study of IC 741 and Comparative study of ICs LM324, LM308 etc.

Unit III: Op-amp Applications-I **(08)**

Open and closed loop configuration, Frequency response of an op-amp in open loop and closed loop configurations, Concept of Virtual Ground. Inverting, Non-inverting, Summing and difference amplifier, Bridge amplifier, DC differential amplifier, Voltage to current converter, Current to voltage converter. Sample and hold Circuits, Integrator, Differentiator.

Unit IV: Op-amp Applications-II **(08)**

Comparators: Basic comparator, Level detector, Voltage limiters, Schmitt Trigger, Zero Crossing Detector.

Precision Rectifier, Log and antilog amplifiers

Signal generators: Phase shift oscillator, Wein bridge oscillator, Square wave generator, triangle wave generator, Saw tooth wave generator.

□ **Learning Outcomes:**

1. Able to study differential amplifier with different parameter
2. Able to design OP-Amp filters of various orders.
3. Avail the skill of design and development of PLL system
4. Able to design Operational amplifier Circuits.

□ **Reference Books:**

1. Op-Amps and Linear IC's, R. A. Gaikwad, Pearson Education (2003)
2. Operational amplifiers and Linear Integrated circuits, R. F. Coughlin and F. F. Driscoll, Pearson Education (2001)
3. Integrated Electronics, J. Millman and C.C. Halkias, Tata McGraw-Hill,(2001)
4. Electronic Principals, A. P. Malvino, 6thEdition , Tata McGraw-Hill,(2003)
5. OP-AMP and Linear Integrated Circuits, K. L. Kishore, Pearson(2011)

Semester III

Paper VI: MN-BET24-302: Microprocessor 8085 (30)

□ **Learning Objectives:**

1. To study basic block diagram of computer
2. To study Importance of Microprocessor.
3. To understand internal blocks of 8085 Microprocessor.
4. To study instruction used during programming

Unit I: Introduction to Microprocessor 8085 **(10)**

Traditional Computer System: CPU and Buses, 8085 Microprocessor, Microprocessor – Initiated operations and Bus organization of 8085. Internal Data operations and 8085 registers. Peripheral or externally initiated operations of 8085, Architecture of 8085 microprocessor.

Unit II: Memory **(06)**

Concept of semiconductor memory and memory Map; Types of memories. I/0 devices, I/0 mapped I/0 and memory mapped I/0. Pin configuration of 8085. 8085 machine cycles and Bus timings.

Unit III: Instructions Set of 8085 **(06)**

Instruction format, Classification of Instruction: Data Transfer, Arithmetic, Logical, Branch and Machine control Instructions. Concept of Stack and Stack Related Instructions, Subroutine, Addressing Modes.

Unit IV: Programming 8085 **(08)**

Program, Algorithm & Flow chart. Program of Addition, Subtraction, Multiplication, Division, Block Transfer and Block related operations, Making Ascending and descending order ; Finding largest and smallest numbers. BCD – to Binary conversion.

□ **Learning Outcomes:**

Student should able to:

1) Understand internal block diagram of CPU
2) Describe the internal architecture: ALU, registers, control unit, buses.
3) Understand the pin configuration and the function of each pin.
4) Classify instructions: data transfer, arithmetic, logical, branching, machine control.
5) Understand instruction formats and addressing modes.

Reference Books:

1) **Microprocessor Architecture, Programming and Applications with the 8085"**
   Author: Ramesh S. Gaonkar
   Publisher: Penram International / Pearson
2) **Fundamentals of Microprocessors and Microcontrollers**
   Author: B. Ram
   Publisher: Dhanpat Rai Publications
3) **The 8085 Microprocessor: Architecture, Programming and Interfacing**
   Author: K.U. Rao
4) **8085 Microprocessor and Its Applications"**
   Authors: A.Nagoor Kani
5) **Microprocessors – Principles and Applications"**
   Author: Ajay V. Deshmukh

Semester III Practical III
Lab
MN-BEP24-303 Credit (2)

□ **Course Objectives:**

1. To study Operational Amplifier applications.
2. To understand working of Oscillator operations.
3. To learn the computer architecture and basic programming concepts.
4. To learn different methods of programming.

GROUP A

1. To study Inverting amplifier using Op-amp (741,351)
2. To study Non-inverting amplifier using Op-amp (741,351)

3. To study Op-amp parameter (741,351)
4. To Study Op amp as adder and subtractor
5. To Study Op amp as integrator and differentiator
6. To Study Op amp as Schmitt trigger
7. To study phase shift and Wien bridge oscillator for given frequency using an op-amp.
8. To study the zero-crossing detector and comparator

GROUP B

1) To study Addition of two 8-bit numbers using Assembly language
2) To study Subtraction of two 8-bit numbers using Assembly language
3) To study Multiplication of two 8-bit numbers using Assembly language
4) To study Division of two 8-bit numbers using Assembly language
5) To study block transfer using microprocessor 8085.
6) Write a program to transfer block of data in reverse order
7) Write a program to block exchange in assembly language

□ **Learning Outcomes:**

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

1) Design various wave shaping circuits for different applications
2) Study of op amp IC 741 characteristics.
3) Study of microprocessor 8085 programming in assembly or C

Semester IV Credit (4)

Paper VII: MN-BET24-401: Linear & Non-linear Circuits (30)

□ **Learning Objectives:**

1. To learn wave shaping circuits and its Advantages in electronics systems
2. To study various types of filters with its applications.
3. To understand working of transistor for different applications.
4. To get familiarize with circuit used to generate different time period.

Unit I Filters: **(05)**

Passive Filters: Concept of Low Pass filter(LPF), High Pass filter(HPF), Band Pass filter (BPF), Band Stop filter (BSF), Designing of LPF, HPF using RC circuits, RC Band Pass filter, RC Band Stop filter

Unit II Non-linear wave shaping: **(10)**

Diode clippers, Clipping, Clamping Circuits: Basic operation of diode clamper with waveform Transistor clipper, clippers at two independent levels-transfer characteristics of clippers-emitter coupled clipper, clamping operation diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input

Time base Circuits: Voltage time base generators: General feature of Time Base Signals, Constant – Current Sweep generator (Miller integrator) Current Time Base Generators.

Unit III Multivibrator **(10)**

BJT as a switch, **Astable Multivibrator:** Collector coupled astable multivibrator, circuit operation, Study of waveform, Expression for output frequency, Duty cycle.

Monostable Multivibrator: Collector coupled monostable multivibrator, circuit operation, study of wave forms, Expression for gate width,

Bistable Multivibrator: Collector coupled bistable multivibrator, circuit operation, study of wave forms, Schmitt Trigger: Circuit operation and applications

Unit IV Time Period Generation **(05)**

UJT sweep generator, Clock pulse generator using logic gates, Design of long duration time period using 555, IC 555 timer as variable duty cycle (10% to 90%).

□ Reference Books:

1. Electronic Communication Systems: Fundamentals through Advanced, W. Tomasi, Pearson Education, 3rd Edition (Unit I, II, III, IV)
2. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
3. Modern Digital and Analog Communication systems- B. P. Lathi, 4rd Edition 2009, Oxford University press
4. Principles of Electronic Communication Systems, Frenzel,3rd edition, McGraw Hill
5.

Semester IV
Practical IV Credit (2)
MN-BEP24-403 (Hardware and Circuit Simulation Software)

Learning Objectives:

1. To learn the fundamental Communication system
2. To understand Digital Communication applications
3. To learn the principles of programming
4. To learn ALP for I/O port, timer, counter and interrupt operations
5. To learn the fundamentals of C programming

GROUP A

1. Study of RC Low Pass Filter (LPF)
2. Study of RC High Pass Filter (HPF)
3. Study of RC integrator and Differentiator
4. Study of clipping and clamping circuits.
5. Study of UJT as a sweep generator
6. Study of Miller integrator
7. To design transistorized astable multivibrator
8. To design transistorized bistable multivibrator
9. Study of IC 555 as mono stable mult-vibrator.

GROUP B

1. Study of Amplitude Modulator and demodulator using Transistor
2. Study of FM – Modulator and Demodulator circuit
3. Study of Phase modulation Circuits
4. Study Pulse Amplitude Modulation (PAM)
5. Study Pulse Width Modulation (PWM)
6. Study of Pulse Code Modulation (PCM)
7. Study of Amplitude Shift Keying
8. Study of Frequency Shift Keying
9. Study of Time Division Multiplexing (TDM)
10. Study of Frequency Division Multiplexing (FDM)

Note : At least one experiments performed using simulation software.

Learning Outcomes:

At the end of this course, the students should be able to:

1. Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
2. Perform the time and frequency domain analysis of the signals in a digital communication system.

3. Select the blocks in a design of digital communication system.
4. Analyze Performance Satellite and Cellular communication.
5. Understand architecture of 8085 microprocessor.

Nature of Question Paper:

4. **CCE-Paper V & VI : Marks =10:**
   Unit 1, 2, 3: Home Assignment/Unit Test

5. **CCE-Paper VII & VIII: Marks =10:**
   Unit 1, 2, 3: Home Assignment/Unit Test

6. **SEE: Marks =40:**
   Unit 1 to 4:
   Multiple Choice questions (1 X08)
   Attempt any two out of three (2X8=16)
   Attempt any four out of six (4X4=16)

(**CCE**- Comprehensive Continuous Evaluation, **ESE** – End Semester Examination)

Sadguru Gadage Maharaj College, Karad.

(An Autonomous College)

Department of Electronics

SEC-I Sem. III

Basic Electricity

Credit:02

Course Outcome:

After completion of this course, the student will be able to,

1) Understand the basics of DC, AC voltage and current
2) Get the knowledge of wiring of AC circuits for home application.

List of Practical's:

1) Study of Wires and switches.
2) Study of current & volt meter
3) Measurement of DC and AC voltage (small voltage).
4) Study of electrical instruments (Multimeter, Tom Tester etc.)
5) Study of tester, high voltage measuring devices.
6) Study of various requirements for fitting(MCB, phase, neutral and earthing)
7) Construction of small AC circuit with one switch & one bulb.
8) Design of electrical circuit using two way switch
9) Construction of extension board with socket, switch, indicator and fuse.
10) Calculation of load in VA and Watt form, selection of fuse.
11) Construction of home light fitting.
12) Wiring connection of Fan Regulator

B. Sc. II – Sem. IV

Electronics

SEC-II AVR Microcontroller Programming

Electronics Practical

Credit:02

Course Outcome:

After completion of this course, the student will be able to,

1. Understand the basics of Arduino (AVR Microcontroller) programming
2. Understand the real-world interfacing with the AVR microcontroller.

List of Practical

1) To study the basics of Arduino programming kits
2) LED interfacing with Arduino
3) Relay interfacing with Arduino
4) LCD interfacing with Arduino
5) LCD interfacing with Arduino using I2C bus

6) Servo motor interfacing with Arduino

7) Development of voltage measurement system

8) Development of temperature measurement system

9) Development of rain sensor wiper

10) Development of flame sensor applications

11) Development of sound detection system

12) Development of obstacle avoidance system

13) Development of RFID based system

14) Development of digital clock using Arduino

B. Sc. II – Electronics
Semester- III
Vocational Skill Course (Major)
VSC – Basic Repairing and Soldering Technique
(Total Marks 50) Credits: 02 (Marks 50) Hours: 30

1. Study of Soldering Components/Instruments.
2. Soldering and desoldering of electronics components on PCB.
3. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.
4. Make the 5V Power Supply and Test the result.
5. Identify the SMD Components and Study the techniques of SMD Components Soldering.
6. Design Low Pass Filter/ High Pass Filter using SMD components Resistor and Capacitor and observe the performance on CRO.
7. Design Monostable multivibrator circuit using SMD components Resistor, Capacitor and IC and observe the performance of Circuit.
8. Design Astable multivibrator circuit using SMD components Resistor, Capacitor and IC and observe the performance on CRO.
9. Testing, fault finding and repairing of ceiling fan/Table fan.
10. Testing, fault finding and repairing of automatic electric iron/non-automatic electric iron.
11. Testing, fault finding and repairing of electric tube.
12. Testing, fault finding and repairing of LED bulb.
13. Testing, fault finding and repairing of adapter (charger).
14. Study of Switch and board connections.
15. Measure Current and Voltage of Bulbs, Tube and Calculates the Load Power.
16. Understand domestic wiring and layout.