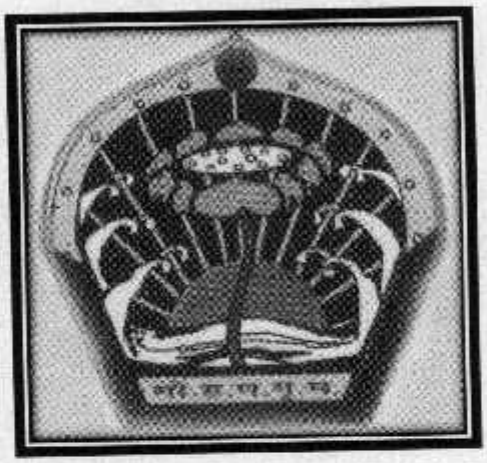
Govt. M H College of Home Science & Science for Women, Jabalpur,M.P.



Department of Physics

UG Syllabus 2023-24

B.Sc. III Year Major I + II

Electronics

PART A: Introduction			
Program: UG	Class: B.Sc.	Year: III	Session:2023-24
Subject: **Electronics**			

1.	Course Code	**S3-ELEC1D**
2.	Course Title	**Microprocessors and Microcontrollers (Theory)**
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Discipline Specific Elective** **Group A Paper I**
4.	Pre-Requisite (if any)	**The student must have had Digital Electronics subject in second year.**
5.	Course Learning Outcomes(CLO)	After completing this course student will be able to: • Understand the basic blocks of microcomputers i.e. CPU, Memory, I/O and architecture of microprocessor's and Microcontroller's • Apply knowledge and demonstrate proficiency of designing hardware interfaces for memory and I/O as well as write assembly language programs for target microprocessor and microcontroller. • Derive specifications of a system based on the requirements of the application and select the appropriate Microprocessor or Microcontroller
6.	Credit Value	**4 credits**
7.	Total Marks	Max. Marks: **30+70** — **Min. Passing Marks: 35**

PART B: Content of the Course

Total No. of Lectures-Tutorials-Practicals (in hours per week): **L-T-P (4-0-0)**

Total No. of Lectures: **60 hours**

Unit	Topics	No. of Lectures (1 hour each)
I	**Introduction to Microprocessor:** Introduction, Applications, Basic block diagram, Speed, Word size, Memory capacity, Classification of microprocessors (mention of different microprocessors being used) **Microprocessor 8085:** Features, Architecture -block diagram, General purpose registers, register pairs, flags, stack pointer, program counter, types of buses. Multiplexed address and data bus, generation of control signals, pin description of microprocessor 8085. Basic interfacing concepts, Memory mapped I/O and I/O mapped I/O. **8085 Instructions:** Operation code, Operand & Mnemonics. Instruction set of 8085, instruction classification, addressing modes, instruction format. Data transfer instructions, arithmetic instructions, increment & decrement instructions, logical instructions, branch instructions and machine control instructions. Assembly language programming examples.	18
II	Stack operations, subroutine, call and return instructions. Delay loops, use of	10

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5/12/23

	counters, timing diagrams-instruction cycle, machine cycle, T- states, time delay. Interrupt structure of 8085A microprocessor, processing of vectored and non-vectored interrupts, latency time and response time; Handling multiple interrupts **Microcontrollers**: Introduction, different types of microcontrollers, embedded microcontrollers, processor architectures. Harvard vs. Princeton, CISC vs. RISC architectures, microcontroller memory types, microcontroller features, clocking, I/O pins, interrupts, timers, peripherals.	
III	**PIC16F887 Microcontroller:** Core features, Architecture, pin diagram, memory organization- Program and data memory organization, I/O Ports, oscillator module, Timer modules (Timer 0, Timer 1 and Timer 2), comparator module, analog-to-digital converter (ADC) module, data EEPROM, Enhanced capture/compare/PWM module, EUSART, master synchronous serial port (MSSP) module, special features of the CPU, interrupts, addressing modes, Instruction set.	18
IV	**Interfacing to PIC16F887:** LED, Switches, Solid State Relay, Seven Segment Display, 16x2 LCD display, 4x4 Matrix Keyboard, Digital to Analog Converter, Stepper Motor and DC Motor. Interfacing program examples using C language.	14

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar – Wiley Eastern Limited- IV Edition.
2. Fundamentals of Microprocessor& Microcomputer: B. Ram—Dhanpat Rai Publications.

Reference Book:

1. MicrochipPIC16F87Xdatasheet
2. PICMicrocontrollers,MilanVerle,,mikroElektronika,1stedition(2008)
3. MuhammadAliMazidi,"MicroprocessorsandMicrocontrollers",Pearson,2006
4. Arduinohttps://www.arduino.cc

Suggestive digital platform web links

https://nptel.ac.in/courses/108107029

https://freevideolectures.com/course/3018/microprocessors-and-microcontrollers

Suggested equivalent online courses

https://onlinecourses.nptel.ac.in/noc22_ee12/preview

https://www.tutorialspoint.com/microprocessor/index.htm

PART D: Assessment and Evaluation

Suggested Continuous Evaluation Methods(CCE):

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): **30 Marks**, University Exam (UE): **70 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	**Class Test/ Assignment/ Presentation**	**30**
Internal Assessment: University Exam Time 3:00 Hours	**Section (A)**: Very Short Questions **Section (B)**: Short Questions **Section (C)**: Long Questions	**70**

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PART A: Introduction

Program: UG	Class: B Sc.	Year: III	Session: 2023-24
Subject : ELECTRONICS			
1. Course Code		S3-ELEC1Q	
2. Course Title		Microprocessors and Microcontrollers Laboratory (Practical)	
3. Course Type (Core Course/Elective/Generic Elective/ Vocational		Group A Paper I	
4. Pre-Requisite (if any)		The student must have had Electronics subject in second year.	
5. Course Learning Outcomes (CLO)		After completing this course student will learn • Be proficient in use of IDE's for designing, testing and debugging microprocessor and microcontroller based system • Interface various I/O devices and design and evaluate systems that will provide solutions to real-world problem • Prepare the technical report on the experiments carried.	
6. Credit Value		2 Credits	
7. Total Marks		Max. Marks: 30+70	Min. Passing Marks: 35

PART B: Content of the Course

Total No. of Lectures-Tutorials-Practicals (in hours per week): L-T-P 0+0+2=2

Total No. of Lab hours: 30 Hrs. (2 hours per week)

Lab Assignments

8085 Assembly language programs:

1. Program to transfer a block of data.
2. Program for multibyte addition
3. Program for multibyte subtraction
4. Program to multiply two8-bitnumbers.
5. Program to divide a 16 bit number by 8 bit number.
6. Program to search a given number in a given list.
7. Program to generate terms of Fibonacci series.
8. Program to find minimum and maximum among N numbers
9. Program to find the square root of an integer.
10. Program to find GCD of two numbers.
11. Program to sort numbers in ascending/descending order.

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12. Program to verify the truth table of logic gates.

PIC Microcontroller Programming

Note: Programs to be written using C programming language

1. LED blinking with a delay of 1 second.
2. Solid State Relay Interface
2. Interfacing of LCD (2X16).
3. Interfacing of stepper motor and Rotating stepper motor by N steps clockwise/ anti clockwise with speed control.
4. To test all the gates of a given IC74XX is good or bad.
5. Generate sine, square, sawtooth, triangular and staircase waveform using DAC interface.
6. Display of 4-digit decimal number using the multiplexed 7-segment display interface.
7. Analog to digital conversion using internal ADC and display the result on LCD.
8. Implementation of DC-Voltmeter(0-5V) using internal ADC and LCD
9. Digital to analog conversion using PWM (pulse delay to be implemented using timers).
10. Speed control of DC motor using PWM (pulse delay to be implemented using timers).
11. Interfacing of matrix keyboard (4X4).
12. Serial communication between microcontroller and PC.

30

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar – Wiley Eastern Limited- IV Edition.
2. PIC Microcontrollers, MilanVerle,,mikroElektronika,1stedition(2008)
3. Muhammad Ali Mazidi,"MicroprocessorsandMicrocontrollers",Pearson,2006

Suggestive digital platform web links

- https://swayam.gov.in/nd1_noc19_ee38/preview

PART D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	30	Viva Voce on Practical	70
Attendance		Practical Record File	
Assignments (Charts/Model /Seminar/Rural Service/Technology Dissemination /Report of Excursion/Lab Visits/Survey/ Industrial Visit / Project (including coding, demo and report))			
		Total Marks : 100	

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PART A: Introduction

Program: UG	Class: B.Sc.	Year: III	Session: 2023-24

Subject: **Electronics**

1.	Course Code	**S3-ELEC2D**
2.	Course Title	**Electromagnetics, Transmission lines and Waveguides (Theory)**
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Discipline Specific Elective** **Group A Paper II**
4.	Pre-Requisite (if any)	**The student must have had Electronics subject in second year.**
5.	Course Learning Outcomes (CLO)	After completing this course student will be able to: • Understand the fundamentals of Electrostatics and Magnetostatics hence get the insight of the characteristics of materials and their interactions with electric and magnetic fields • Understand the application of Vector Differential and Integral operators in Electromagnetic Theory. • Interpret Maxwell's equations in differential and integral forms, both in time and frequency domains. • Describe the complex ε, μ, and σ, plane waves, Snell's laws from phase matching, and calculate the reflection and transmission coefficients at the interface of simple media • Calculate input impedance and reflection coefficient of an arbitrarily terminated transmission-line and can use Smith chart to convert these quantities. • Explain the phenomenon of transmission line and its types. • Perform calculation for finding out performance parameters of transmission lines like losses SWR • Understand the modes of transmission in waveguides and other components involved in microwave communications.
6.	Credit Value	**6 credits**
7.	Total Marks	Max. Marks: **30+70** | Min. Passing Marks: 35

PART B: Content of the Course

Total No. of Lectures-Tutorials-Practicals (in hours per week): **L-T-P (6-0-0)**

Total No. of Lectures: **90 hours**

Unit	Topics	No. of Lectures

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		(1 hour each)
I	**Vector Analysis:** Scalars and Vectors, Vector Algebra, Rectangular (Cartesian) Coordinate System, Vector Components and Unit Vector, Vector Field, Products, Cylindrical Coordinates, Spherical Coordinates, Differential Length, Area and Volume, Line Surface and Volume integrals, Del Operator, Gradient of a Scalar, Divergence and Curl of a Vector, the Laplacian. **Electrostatic Fields:** Coulomb's Law and Electric Field, Field due to Discrete and Continuous Charge Distributions, Electric Flux Density, Gauss's Law and Applications, Divergence Theorem and Maxwell's First Equation. Electric Potential, Potential due to a Charge and Charge distribution, Electric dipole. Electric Fields in Conductors, Current and Current Density, Continuity of Current, Metallic Conductor Properties and Boundary Conditions, Method of Images. Dielectric materials, Polarization, Dielectric Constant, Isotropic and Anisotropic dielectrics, Boundary conditions, Capacitance and Capacitors. Electrostatic Energy and Forces.	18
II	**Poisson's Equation and Laplace's Equation:** Derivation of Poisson's and Laplace's equation, Uniqueness Theorem, Examples of Solution of Laplace's Equation: Cartesian, Cylindrical and Spherical Coordinates. **Magnetostatics:** Biot Savert's law and Applications, Magnetic dipole, Ampere's Circuital Law, Curl and Stoke's Theorem, Maxwell's Equation, Magnetic Flux and Magnetic Flux Density, Scalar and Vector Magnetic Potentials. Magnetization in Materials and Permeability, Anisotropic materials, Magnetic Boundary Conditions, Inductors and Inductances, Magnetic Energy, Magnetic Circuits. Inductances and Inductors, Magnetic Energy, Forces and Torques.	10
III	**Time-Varying Fields and Maxwell's Equations:** Faraday's Law of Electromagnetic Induction, Stationary Circuit in Time-Varying Magnetic Field, Transformer and Motional EMF, Displacement Current, Maxwell's Equations in differential and integral form and Constitutive Relations. Potential Functions, Lorentz gauge and the Wave Equation for Potentials, Concept of Retarded Potentials. Electromagnetic Boundary Conditions. Time- Harmonic Electromagnetic Fields and use of Phasors	18
IV	**Electromagnetic Wave Propagation:** Time-Harmonic Electromagnetic Fields and use of Phasors, the Electromagnetic Spectrum, Wave Equation in a source free isotropic homogeneous media, Uniform Plane Waves in Lossless and Lossy unbounded homogeneous media, Wave Polarization, Phase and Group velocity, Flow of Electromagnetic Power and Poynting Vector. Uniform Plane wave incident on a Plane conductor boundary, concept of reflection and standing wave. **Guided Electromagnetic Wave Propagation:** Waves along Uniform Guiding Structures, TEM, TE and TM waves, Electromagnetic Wave Propagation in Parallel Plate and Rectangular Metallic Waveguides.	14
V	**Transmission Lines:** Typical Transmission lines- Co-axial, Two Wire, Microstrip, Coplanar and Slot Lines, Transmission Line Parameters, Transmission Line Equations, Wave propagation in Transmission lines, low loss, lossless line, Distortion less line, Input Impedance, Standing Wave Ratio, Power. and lossy lines, Shorted Line, Open-Circuited Line, Matched Line, Smith Chart, Transmission Line Applications.	15
VI	**Waveguides and Waveguide Devices:** Wave propagation in waveguides, Parallel plate waveguides, TEM, TM and TE modes, Rectangular waveguides, circular	15

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	waveguides, Power transmission and attenuation, Rectangular cavity resonators, directional couplers, isolator, circulator.	

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

1. Murray. R. Spiegel, Vector Analysis, Schaum series, Tata McGraw Hill(2006)
2. M.N. O. Sadiku, Elements of Electromagnetics, Oxford University Press (2001) -
3. W. H. Hayt and J.A. Buck, Engineering Electromagnetics, Tata McGraw-Hill (2006)
4. D.C. Cheng, Field and Wave Electromagnetics, Pearson Education (2001)
5. J.A. Edminster, Electromagnetics, Schaum Series, Tata McGraw-Hill (2006)

Reference Book:

1. N. Narayan Rao, Elements of Engineering Electromagnetics, Pearson Education (2006)
2. Introduction to Electrodynamics, D. J. Griffiths, Pearson Education (2012)
3. Electromagnetic Wave and Radiating System, Jordan and Balmain, Prentice Hall (1979)

Suggestive digital platform web links

https://onlinecourses.nptel.ac.in/noc21_ee83/preview

Suggested equivalent online courses

https://ocw.mit.edu/courses/6-013-electromagnetics-and-applications-spring-2009/
https://www.udemy.com/topic/electromagnetism/

PART D: Assessment and Evaluation

Suggested Continuous Evaluation Methods(CCE):
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): **30 Marks**, University Exam (UE) : **70 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	**Class Test/ Assignment/ Presentation**	**30**
Internal Assessment: University Exam Time 3:00 Hours	**Section (A)**: Very Short Questions **Section (B)**: Short Questions **Section (C)**: Long Questions	**70**

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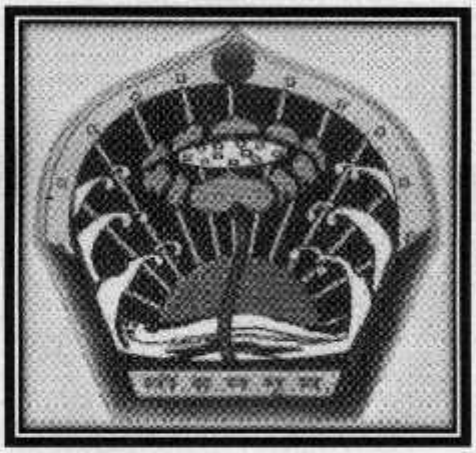

Department of Physics

UG Syllabus 2023-24

B.Sc. III Year Minor/Elective

Electronics

PART A: Introduction

Program: UG	Class: B.Sc.	Year: III	Session: 2023-24

Subject: **Electronics**

1.	Course Code	S3-ELEC2T
2.	Course Title	**Electronic Communication**
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Minor/ Elective**
4.	Pre-Requisite (if any)	**The student must have had Electronics subject in second year.**
5.	Course Learning Outcomes (CLO)	After completing this course student will be able to: • Design basic digital communication systems to solve a given communications problem and they become conversant with the requirements and the protocols employed in the fundamental components in a communication network. • Understand simple block forward error correction codes and basic dispersion compensation concepts and also the concepts of up/down conversion and modulation • Determine the suitability of a particular communication system to a given problem • Describe the concept of "noise" in analog and digital communication systems. Also, get insight on the trade-offs (in terms of bandwidth, power, and complexity requirements) in basic digital communication systems.
6.	Credit Value	**4 credits**
7.	Total Marks	Max. Marks: **30+70** — **Min. Passing Marks: 35**

PART B: Content of the Course

Total No. of Lectures-Tutorials-Practicals (in hours per week): **L-T-P (4-0-0)**

Total No. of Lectures: **60 L**

Unit	Topics	No. of Lectures
I	**Electronic Communication**: Block diagram of an electronic communication system, electromagnetic spectrum-band designs and applications, 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.	10
II	**Amplitude Modulation:** Amplitude Modulation, modulation index and frequency spectrum. Generation of AM, Amplitude Demodulation (diode detector), Concept of Double side band suppressed carrier, Single sideband suppressed carrier, other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation,	20

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	Independent Side Band Modulation). Block diagram of AM Transmitter and Receiver **Angle modulation:** Frequency and Phase modulation, modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM (direct and indirect methods), FM detector (PLL). Block diagram of FM Transmitter and Receiver Comparison between AM, FM and PM.	
III	**Pulse Analog Modulation:** Channel capacity, Sampling theorem, PAM, PDM, PPM modulation and detection techniques, Multiplexing, TDM and FDM. **Pulse Code Modulation:** Need for digital transmission, Quantizing, Uniform and Nonuniform Quantization, Quantization Noise, Companding, Coding, Decoding, Regeneration.	14
IV	**Digital Carrier Modulation Techniques:** Block diagram of digital transmission and reception, Information capacity, Bit Rate, Baud Rate and M-ary coding. Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK) and Quadrature Phase Shift Keying (QPSK)	16

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

1. Modern Digital and analog communication systems, B P Lathi, Oxford University Press, Fourth Ed.
2. Electronic Communication systems- Kennedy, 3rd edition, McGraw Hills

Reference Book:

1. Principles of Electronic communication systems–Frenzel,3rd edition, McGraw Hill
2. Communication Systems, S. Haykin, Wiley India(2006)

Suggestive digital platform web links

https://nptel.ac.in/courses/106106097

Suggested equivalent online courses

https://www.classcentral.com/course/swayam-principles-of-communication-systems-l-7963

PART D: Assessment and Evaluation

Suggested Continuous Evaluation Methods(CCE):

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): **30 Marks**, University Exam (UE) : **70 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	**Class Test/ Assignment/ Presentation**	**30**
Internal Assessment: University Exam Time 3:00 Hours	**Section (A):** Very Short Questions **Section (B):** Short Questions **Section (C):** Long Questions	**70**

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PART A: Introduction

Program: UG	Class: B.Sc.	Year: III	Session: 2023-24

Subject: ELECTRONICS

1.	Course Code	**S3-ELEC2P**	
2.	Course Title	**Electronic Communication Lab**	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Minor/Elective**	
4.	Pre-Requisite (if any)	**The student must have had Electronics subject in second year.**	
5.	Course Learning Outcomes (CLO)	After completing this course student will learn to • Understand basic elements of a communication system. • Analyze the baseband signals in time domain and in frequency domain. • Build understanding of various analog and digital modulation and demodulation techniques. • Prepare the technical report on the experiments carried.	
6.	Credit Value	2 Credits	
7.	Total Marks	Max. Marks: 30+70	Min. Passing Marks: 35

PART B: Content of the Course

Total No. of Lectures-Tutorials-Practicals (in hours per week): L-T-P (0-0-2)

Total No. of Lab hours: 30 Hrs. (2 hours per week)

Lab Assignments

Using Hardware and Circuit Simulation Software)

1. Study of Amplitude Modulation
2. Study of Amplitude Demodulation
3. Study of Frequency Modulation
4. Study of Frequency Demodulation
5. Study of Pulse Amplitude Modulation
6. AM Transmitter/Receiver
7. FM Transmitter/Receiver
8. Study of TDM, FDM
9. Study of Pulse Width Modulation
10. Study of Pulse Position Modulation
11. Study of Pulse Code Modulation

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12. Study of Amplitude Shift Keying 13. Study of Phase Shift Keying, 14. Study of Frequency Shift Keying.	30

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

https://www.routledge.com/Communications-System-Laboratory/Kumar/p/book/9780367783341

Suggestive digital platform web links

https://vlab.amrita.edu/index.php?sub=59

https://www.etti.unibw.de/labalive/

PART D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	30	Viva Voce on Practical	70
Attendance		Practical Record File	
Assignments (Charts/Model /Seminar/Rural Service/Technology Dissemination /Report of Excursion/Lab Visits/Survey/ Industrial Visit / Project (including coding, demo and report))			
		Total Marks : 100	

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