Bachelor of Science
Electronics
Semester: V

Course Code	US05MAELE01	Title of the Course	8 bit Microprocessor Programming & Applications-1
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	The course is to make the students understand the architecture of the 8085 microprocessor, working of Microprocessor and its programming.

Unit	Description	Weightage In %
1.	**8085 Architecture:** The 8085 Microprocessor unit, Bus timing, De-multiplexing the bus, Generating control signal, A detailed look at the 8085 Microprocessor and its architecture, Examples of 8085 based microcomputer	25
2.	**Arithmetic and logic instructions:** Instruction classification, Method of writing and executing a simple program, Addressing modes, Data transfer Instruction set, Arithmetic instruction set, Logical instruction set, program related to Arithmetic and logical instruction.	25
3	**Branch operations:** Branch operations and their related programs, writing assembly language programs, Debugging a program, programming techniques: Looping, Counting and Indexing and their related flow charts, Additional Data transfer and 16 bit Arithmetic instruction and related program.	25
4	**Memory Operations:** Arithmetic operations related to memory, Logical operations : Rotate and compare and related programs, Dynamic Debugging.	25

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Written Test, Quizzes, Assignments, Active learning, Viva-voce, Seminars, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the architecture of 8085 microprocessors and concept of Bus timing and Demultiplexing.
2.	Understand classification of instructions and learn arithmetic and Logical programming.
3	Understand different types of programming and techniques and about 16 bit programs.
4	Understand memory related arithmetical and logical operations and also Dynamic debugging of software programs.

Suggested References:	
Sr. No.	**References**
1.	Microprocessor , Architecture, Programming and Applications with the 8085/8080 By : Ramesh S. Gaonkar
2.	8085 Microprocessor programming and interfacing By: N. K. Shrinath
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MAELE02	Title of the Course	Linear Integrated Circuits
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	The course is to make the students i) To learn the various applications (linear and non-linear) of OP-AMP. ii) To learn about 555 timer and phase-lock loop system.

Unit	Description	Weightage In %
1.	**Operational Amplifier & linear Applications of OP–AMP:** Block diagram of OP-AMP, Difference amplifier, Virtual short concept, AC and DC parameters, Inverting amplifier and its applications – Scale changing amplifier, Summing amplifier, Phase shifting amplifier, Integrator, Differentiator, Summing integrator, Difference amplifier and Subtractor, Comparison of active and passive filter, Introduction to - Low pass filter, High pass filter, Band pass filter, Band reject filter, All pass filter.	25
2.	**Nonlinear Applications of OP–AMP:** Feedback diode comparator, Precision rectifier - Half wave precision rectifier, Full wave precision rectifier, Peak detector, Sample and hold (S/H) circuit, Monostable multivibrator, Bistable multi vibrator, Astable multi vibrator, Voltage Controlled Oscillator (VCO).	25
3	**Miscellaneous applications of OP–AMP:** Log amplifier: Basic equation, Basic logarithmic amplifier, Temperature compensated LOG amplifier, Antilog (Exponential) amplifier, Analog voltage multiplier, Analog voltage divider, Charge amplifier, Frequency to Voltage conversion, Clipper and Clamper circuits, Temperature to Voltage Converter.	25
4	**IC 555 Timer and PLL**: Salient features of 555 Timer IC, Pin diagram and Functional diagram, Astable multivibrator and its applications, Monostable multivibrator and its applications, Schmitt trigger, Bistable multivibrator, Basic operating principle of PLL.	25

Teaching-Learning	• Online and Board work, • ICT enabled teaching,

Methodology	• Group discussion, • Case Study & Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Written Test, Quizzes, Assignments, Active learning, Viva-voce, Seminars, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand various applications of OP-AMP and 555 Timer. The arithmetic applications include adder, Subtractor, scalar and linear applications such as phase-shift amplifier, integrator, differentiator, etc.
2.	Understand various non-linear application of OP-AMP which includes diode comparator, precision rectifier, peak detector, S/H circuit and various multivibrators.
3	Understand Miscellaneous application of OP-AMP, this includes LOG and anti LOG amplifiers, exponential amplifier, and other related applications.
4	Understand about 555 timer and its applications such as Astable multivibrator and Mono stable multivibrator. They will also learn principle of PLL.

Suggested References:	
Sr. No.	**References**
1.	Linear Integrated Circuits and its applications: P. W. Wani and P. V. Bhat
2.	OP - Amp and linear integrated circuits: R. A. Gaykwad
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MAELE03	Title of the Course	Electronics Practicals.
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	The course is to make the students to understand 1. 8085 and its programming. 2. Various applications of OP – AMP and 555 Timer ICs.

Part -1

No	Title of Practical	Weightage
1.	Hexadecimal 8 Bit Arithmetic operations addition using 8085.	**50%**
2.	Hexadecimal 8 Bit Arithmetic operations subtraction using 8085.	
3.	Logical operations (AND, OR, NOT) using 8085.	
4.	Logical operations (NAND, NOR) using 8085.	
5.	1'S and 2'S compliment of 8 bit data using 8085.	
6.	Hexadecimal 16 Bit Arithmetic operations addition using 8085.	
7.	Hexadecimal 16 Bit Arithmetic operations subtraction using 8085.	
8.	Logical operations (Rotate Left and Right) using 8085.	
9.	Other experiments based on syllabus	

Part -2

No	Title of Practical	Weightage
1.	Parameters of OP-AMP.	**50%**
2.	OP-AMP as inverting and Non-inverting Amplifier.	
3.	OP-AMP as square wave and Triangle wave generator.	
4.	OP-AMP as integrator and differentiator.	
5.	OP-AMP as adder and Subtractor.	

6.	OP-AMP as Difference Amplifier.	
7.	555 Timer as Astable Multivibrator.	
8.	555 Timer as Mono stable Multivibrator.	
9.	Other experiments based on Theory.	

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study & Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Practical Test, Quizzes, Active learning, Viva-voce, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to understand the	
1.	Architecture of the 8085 microprocessor, working of Microprocessor and its programming.
2.	Various applications (linear and non-linear) of OP-AMP.
3.	About 555 timer and phase-lock loop system.

Suggested References:	
Sr. No.	**References**
1.	Microprocessor , Architecture, Programming and Applications with the 8085/8080 By : Ramesh S. Gaonkar
2.	Linear Integrated Circuits and its applications: P. W. Wani and P. V. Bhat
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MIELE01	Title of the Course	Digital Electronics – 1
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	The course is to make the students understand (i) Various basic and universal Logic gates, (ii) XOR and XNOR gate and its applications, (iii) Various Flip flops and the working of registers.

Unit	Description	Weightage In %
1.	**Logic gates**: AND, OR, NOT, Universal gates: NAND, NOR, XOR-XNOR Gates and their applications, Parity Checker, Code Convertor, Controlled Inverter, Comparator, Half and Full Adder, Half and Full Subtractor, Two's complement Addition and Subtraction using parallel Adders.	50
2.	**Flip Flops** and **Registers:** RS Flip Flop, Clocked R S Flip Flop, D Flip Flop, Edge Triggered D Flip Flop, J K Flip Flop, JK Master/Slave Flip Flop, Introduction, Buffer Register, Controlled Buffer Register, Data Transmission in shift registers, Serial-in serial-out shift registers, serial in parallel-out shift registers, Parallel-in serial-out shift register, parallel in parallel-out shift registers, Bidirectional shift registers.	50

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Written Test, Quizzes, Assignments, Active learning, Viva-voce, Seminars, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to understand	
1.	Working and construction of basic and universal logic gate,
2.	Various applications of X-OR and XNOR gates.
3.	Working of various flips flops and its applications as data transmission in shift registers.

Suggested References:	
1.	Digital Electronics by W. H. Gothmann
2.	Digital Principles and Applications by A. P. Malvino and D. P. Leach
3.	Fundamental of Digital circuits By : A. Anand Kumar
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MIELE02	Title of the Course	Electronics Practicals.
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	The course is to make the students understand the various basic and universal Logic gates, XOR and XNOR gate and its applications, various Flip flops and the working of registers.

No	Title of Practical	Weightage
1.	Logic gates using ICs	**100%**
2.	Logic gates using discrete components	
3.	XOR and XNOR gate applications	
4.	Half and Full adder	
5.	Half and Full subtractor	
6.	Flip- flops	
7.	Shift register	
	Other experiments based on Theory.	

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Practical Test, Quizzes, Active learning, Viva-voce, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to understand	
1.	Construction and working of various basic and universal Logic gates and its applications.
2.	XOR and XNOR gate and its applications construction and working.
3.	Construction and working of various flip flops and Registers.

Suggested References:	
1.	Digital Electronics by W. H. Gothmann
2.	Digital Principles and Applications by A. P. Malvino and D. P. Leach
3.	Fundamental of Digital circuits By : A. Anand Kumar
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MIELE03	Title of the Course	Transistor Amplifiers
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	The course is to make the students understand the Transistor applications as small signal amplifier and power amplifier.

Unit	Description	Weightage In %
1.	**Small Signal Amplifiers:** Single stage transistor Amplifier, Graphical Method, Equivalent circuit, h Parameters equivalent circuit, Amplifier analysis, Multistage Amplifiers, Gain of multistage amplifier, RC coupled, Transformer coupled and Direct coupled amplifier, frequency response	50
2.	**Power Amplifier** Need for Power Amplifier, Single ended power amplifier, impedance matching, Analysis of power amplifier, Class A, Class AB, Class B and Class C amplifiers, Push Pull Amplifier, Distortion in Push Pull amplifier, Complementary-Symmetry push pull amplifier.	50

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Written Test, Quizzes, Assignments, Active learning, Viva-voce, Seminars, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the construction of transistors small signal amplifier.
2.	Understand types of power amplifier and its uses.

Suggested References:	
Sr. No.	**References**
1.	Basic Electronics and Linear Circuits By Bhargava, Kulshreshtha and Gupta.
2.	Electronics Devices and Circuits By David A. Bell.
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MIELE04	Title of the Course	Electronics Practicals.
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	This course is designed to understand various types of amplifier circuit working and its behaviour

No	Title of Practical	Weightage
1.	Single stage CE amplifier frequency response	**100%**
2.	Negative feedback amplifier	
3.	Voltage gain of amplifier with and without feedback	
4.	Study the effect of various feedback on gain of an amplifier	
5.	Two stage RC coupled amplifier frequency response	
6.	Push pull amplifier power gain	
7.	Other experiments based on Theory.	

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Practical Test, Quizzes, Active learning, Viva-voce, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the uses of transistor as an amplifier.
2.	Understand types of power amplifier and its working.

Suggested References:	
Sr. No.	**References**
1.	Basic Electronics and Linear Circuits By Bhargava, Kulshreshtha and Gupta.
2.	Electronics Devices and Circuits By David A. Bell.
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MIELE05	Title of the Course	8085 Microprocessor & Programming -1
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	The course is to make the students understand working of 8085 Microprocessor and its programming.

Unit	Description	Weightage In %
1.	**8085 Architecture:** The 8085 Microprocessor unit, Bus timing, De multiplexing the bus, Generating control signal, A detailed look at the 8085 Microprocessor and its architecture, Examples of 8085 based microcomputer.	50
2.	**8085 Programming:** Instruction classification, Method of writing and executing a simple program, Addressing modes, Data transfer Instruction set, Arithmetic instruction set, Logical instruction set, program related to Arithmetic and logical instruction.	50

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Written Test, Quizzes, Assignments, Active learning, Viva-voce, Seminars, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Suggested References:	
Sr. No.	**References**
1.	Microprocessor , Architecture, Programming and Applications with the 8085/8080 By : Ramesh S. Gaonkar
2.	8085 Microprocessor programming and interfacing By: N. K. Shrinath
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05MIELE06	Title of the Course	Electronics Practicals.
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	The course is to make the students understand working of 8085 Microprocessor and its programming.

No	Title of Practical	Weightage
1.	Hexadecimal 8 Bit Addition (Direct addressing).	**100%**
2.	Hexadecimal 8 Bit Addition (Register addressing).	
3.	Hexadecimal 8 Bit Subtraction (Direct addressing).	
4.	Hexadecimal 8 Bit Subtraction (Register addressing).	
5.	Logical operations (AND, OR, NOT) using 8085.	
6.	Logical operations (NAND, NOR) using 8085.	
7.	1'S and 2'S compliment of 8 bit data using 8085.	
	Other experiments based on Theory.	

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Practical Test, Quizzes, Active learning, Viva-voce, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the architecture of 8085 microprocessors and concept of Bus timing and Demultiplexing.
2.	Understand classification of instructions and learn arithmetic and Logical programming.

Suggested References:	
Sr. No.	**References**
1.	Microprocessor , Architecture, Programming and Applications with the 8085/8080 By : Ramesh S. Gaonkar
2.	8085 Microprocessor programming and interfacing By: N. K. Shrinath
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05SEELE01	Title of the Course	Optical Fibers.
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	The course is to make the students understand i) The principles and construction of optical fibers. ii) The light source and detector devices used in Fiber communication systems.

Unit	Description	Weightage In %
1.	**Principles, Sources and Detectors:** Fiber principle (total internal reflection), Construction, types of fibers, Sources: Light Emitting Diodes, LASERS, Detectors: Avalanche Photodiode, PIN photodiode. Fiber characteristics parameters, Losses, Dispersion.	50
2.	**Optical Communication system:** Block diagram of Fiber optics Communication system, Repeaters. Fiber Cables & Splicing of Fibers.	50

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Written Test, Quizzes, Assignments, Active learning, Viva-voce, Seminars, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the principles of the Optical communication systems.
2.	Understand Sources and detectors used in OFC systems.
3.	Understand the functioning of Optical Communication system

Suggested References:	
Sr. No.	**References**
1.	Fiber Optics Communication By D.C. Agrawal (S Chand & Company)
2.	Fiber - Optic Communication Systems Third Edition By Govind P Agrawal
On-line resources to be used if available as reference material	

Bachelor of Science
Electronics
Semester: V

Course Code	US05SEELE02	Title of the Course	Electronics Projects and Troubleshooting.
Total Credits of the Course	2	Hours per Week	4

Course Objectives:	This course is designed to understand the architecture of the Arduino, its programming language, the software tools and construction of various projects.

Unit	Description	Weightage In %
1.	Soldering technique, Architecture of ARDUINO UNO, Programming of ARDUINO.	50
2.	Construction of Electronics projects based on Micro controller and ARDUINO.	50

Teaching-Learning Methodology	• Online and Board work, • ICT enabled teaching, • Group discussion, • Case Study, • Problem solving.

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Internal Continuous Assessment in the form of Internal Practical Test, Quizzes, Active learning, Viva-voce, Attendance (As per NEP Guideline)		50%
2.	University examination		50%

Evaluation Pattern (Internal / External Examinations)			
Sr. No.		**Details of the Evaluation**	**Weightage**
1.	Continuous	• Class test/Internal Written test (30%)	50%

	and Comprehensive Evaluation	• Quiz (30%) • Active learning (10%) • Home Assignments (10%) • Class Assignments (10%) • Attendance (10%)	
2.	End Semester Examination	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the architecture of the ARDUINO UNO and its programming through the open source software.
2.	Construct the hardware and software for the application project.
On-line resources to be used if available as reference material	