STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examination for

IVTH SEMESTER DIPLOMA IN ELECTRONICS ENGINEERING

(Effective form Session 2020-2021 Batch), (Rev. 1.0)

THEORY

S.No	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION SCHEME							Credits
			Periods per week	Hours of Exam	Teacher's Assessment (TA) Marks (A)	Class Test (CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Microcontroller and its Applications	2021401	03	03	10	20	70	100	28	40	03
2.	Consumer Electronics	2021402	04	03	10	20	70	100	28	40	03
3.	Digital Communication Systems	2021403	03	03	10	20	70	100	28	40	03
4.	Electronic Equipment Maintenance	2021404	04	03	10	20	70	100	28	40	03
5.	Linear Integrated Circuits	2021405	03	03	10	20	70	100	28	40	03
Total : 17							350	500			15

PRACTICAL

S.No	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION SCHEME					
			Periods per week	Hours of Exam	Practical		TotalMarks(A+B)	Pass Marks in the Subject	Credits
					Internal (PA) A	External (ESE) B			
6.	Microcontroller and its Applications Lab	2021406	02 50% Physical 50% Virtual	03	15	35	50	20	01
7.	Digital Communication Systems Lab	2021407	02 50% Physical 50% Virtual	03	07	18	25	10	01
8.	Linear Integrated Circuits Lab	2021408	02 50% Physical 50% Virtual	03	07	18	25	10	01
9.	MATLAB	2020409	02 50% Physical 50% Virtual	03	07	18	25	10	01
Total: 08							125		04

TERM WORK

S.No	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION SCHEME				
			Periods per week	Marks of Internal Examiner PA (X)	Marks of External Examiner ESE (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
10.	Essence of Indian Knowledge and Tradition (TW)	2021410	02	07	18	25	10	01
11.	Microprocessor & its Application Lab (TW)	2021411	02	07	18	25	10	01
12.	Minor Project (TW)	2021412	04	15	35	50	20	02
13.	Block Chain through Moocs / Swaym / Others (TW)	2021413	02	07	18	25	10	01
						125		05
Total Periods per week of each duration One Hour = 35						Total Marks:750		24

MICROCONTROLLERANDITSAPPLICATION(ELECTRONICSENGINEERINGGROUP)

Subject Code20214 01	Theory						Credits
	No.of Periods PerWeek			FullMarks	:	100	03
	L	T	P/S	ESE	:	70	
	03	-	-	TA	:	10	
	-	-	-	CT	:	20	

CourseObjectives:

Theaimofthiscourseistohelpthestudentsto attainthefollowingindustryidentified competencythroughvarious teachinglearning experiences:

- **Maintainmicrocontroller-basedsystems.**

CONTENTS:THEORY

Chapter	NameoftheTopic	Hours
Unit1	**Introduction** 1.1 Introduction to Microprocessors and Microcontrollers, IntelMCS51familyfeatures. 1.2 Microcontroller 8051: Pin-diagram,Introduction to 8051 Micro-controller, Architecture. 1.3 Memory organization, Special function registers andarchitecture. 1.4 Port Operation, Memory Interfacing, I/O Interfacing.	**8**
Unit2	**8051instructionsetandprogramming** (inassembly and C programming) 2.1 Addressingmodes. 2.28051instructionset: Data Transfer,conditionalinstructions, arithmetic and logic operations, single bit instructions with suitable examples. 2.3 Interrupts: types of interrupts, interrupthandling. 2.4 programmable counters and timers. 2.5 Stack.	**12**
Unit3	**Programming in assembly and C** 3.1 Programming 8051 resources, interrupts. 3.2 Programmer's model of 8051, Operand types, Operand addressing, 3.3Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions. 3.4 Timer & Counter Programming. 3.5 Interrupt Programming.	**12**
Unit4	**Interfacing with input and output devices (in assembly and C program)** 4.1 Keyboard, ADC, DAC, Temperature Sensors, and UART. 4.2 Timers/counters. 4.3 Stepper Motor, DC Motor. 4.4 LCD, SEVEN Segment LED.	**12**
	TOTAL	**44**

References:

S.No.	Title of Book	Author	Publication
1.	The 8051 Micro Controller architecture, programming and applications	Kenneth J. Ayala	Western Carolina University
2.	The8051MicroControllerandEmbeddedSystems	Muhammad AliMazidi&Janice GilliMazidi, R.D. Kinely	Eastern Company Edition, Prentice Hall of India, New Delhi
3.	Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051	SoumitraKumarMandal	McGraw Hill Edu,
4.	Microcontrollers:Architecture implementation and Programming	Tabak Daniel, Hintz Kenneth j	Tata McGraw Hill, 2007
5.	Microprocessors and interfacing: programming and hardware	Douglas V. Hall	Tata McGraw Hill, 2editon, 2007
6.	Microcontroller and Application	Manish Bhargava	FPH
7.	"Microcontroller – Fundamentals and Applications with Pic	Valder – Perez	Yeesdee Publishers, Tayler & Francis

Course outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned objective:

1. Analyze architecture of microcontroller ICs.
2. Interpret the program of 8051 in assembly language for the given operations.
3. Interpret the program by using timer interrupt and serial ports parallel ports.
4. Interface the memory and IO devices to 8051 microcontrollers.
5. Maintain microcontroller used in different application.

Course Articulation Matrix (CAM)
Course Code: 2021401

Coursecode .COnumber	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021401.1	Analyze architecture of microcontroller ICs.	3	1	-	-	-	-	-	-	**-**
C2021401.2	Interpret the assembly language program by using 8051 Microcontroller for different operations.	2	2	3	2	-	-	1	-	**-**
C2021401.3	Interpret the program by using timer interrupt and serial ports parallel ports.	1	2	2	3	2	-	1	-	**-**
C2021401.4	Interface the memory and IO devices to 8051 microcontrollers.	1	2	3	1	-	-	2	-	**-**
C2021401.5	Maintain microcontroller used in different application.	-	3	3	3	2	2	3	-	**-**
C2021401 (Average)		**1.75**	**2**	**2.75**	**2.25**	**2**	**2**	**1.75**	**-**	**-**

Correlation levels 1, 2 or 3 as:- 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, Then put "-"

CONSUMER ELECTRONICS
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021402	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	-	-	TA	:	10	
	-	-	-	CT	:	20	

Course Objectives:
The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Maintain various consumer electronic appliances/equipments.**

CONTENTS: THEORY

Chapter	Name of the Topic	Hours
Unit 1	**Audio Fundamentals and Devices** 1.1 Basic characteristics of sound signal, Audio level metering, decibel level in acoustic measurement. 1.2 Microphone & Types, speaker types & working principle. 1.3 Sound recording principle & types.	09
Unit 2	**Audio Systems** 2.1 Hometheatresoundsystem,surroundsound. 2.2 Digitalconsoleblock diagram, working principle, applications. 2.3 FM tuner, ICs used in FM tuner TDA 7021T. 2.4 PA addresssystem.	09
Unit 3	**Television Systems-** 3.1 Monochrome TV standards, scanning process, aspect ratio. 3.2 persistence of vision and flicker, interlace scanning, picture resolution, Composite video signal. 3.3 Color TV standards, color theory, hue, brightness, saturation, luminance and chrominance. 3.4 Different types of TV camera, Transmission standards.	12
Unit 4	**Television Receivers and Video Systems-** 4.1 PAL-D color TV receiver. 4.2 Digital TVs: - LCD, LED, PLASMA, HDTV, 3- D TV, projection TV. 4.3 DTH receiver, Video interface,Digital Video, SDI, HDMI Multimedia Interface. 4.4 Digital Video Interface, CD and DVD player.	12
Unit 5	**Home / Office Appliances** 5.1 Diagrams, operating principles and controller for FAX and Photocopier.5.2 Microwave Oven, Washing Machine. 5.3 Air conditioner and Refrigerators. 5.4 Digital camera and CAM coder.	08
	TOTAL	50

References:

S.No.	Title of Book	Author	Publication
1.	Consumer Electronics	Bali S.P.	Pearson Education India,2010 , latest edition
2.	Audio video systems: principle practices & troubleshooting	Bali R and Bali S.P.	Khanna Book Publishing Co. (P)Ltd., 2010Delhi , India, latest edition
3.	Modern Television practices	Gulati R.R.	New Age InternationalPublication(P)Ltd.NewDelhiYear2011, latestedition
4.	Audio video systems	Gupta R.G.	Tata Mc graw Hill, New Delhi, India 2010, latest edition
5.	Mastering Digital Television	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010, latest edition
6.	Consumer Electronics	Neeraj Sharma	FPH (Foundation Publishing House)
7.	Standard hand book of Audio engineering	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010, latest edition.

Course outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with theabove-mentioned objective:

1. Explain the different types of microphone and speakers.
2. Illustrate audio systems.
3. Analyze the composite video signal used in TV signal transmission.
4. Analyze the Troubleshoot color TV receiver.
5. Examine various consumer electronics appliances.

Course Articulation Matrix:

Course Code: 2021402

Course code.CO number	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021402.1	Explain the Different types of microphone and speakers.	3	3	2	-	1	-	1	1	1
C2021402.2	illustrate audio system.	3	3	2	1	-	-	-	2	-
C2021402.3	Analyze the composite video signal used in TV signal transmission.	2	3	2	1	-	1	-	2	-
C2021402.4	Analyze the Troubleshoot color TV Receiver.	3	2	3	2	1	1	1	1	1
C2021402.5	Examine various consumer electronics appliances.	1	2	3	3	1	-	-	2	1
C2021402 (Average)		**2.4**	**2.6**	**2.4**	**1.75**	**1**	**1**	**1**	**1.6**	**1**

Enter correlation levels 1, 2 or 3 as:- 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, Then put "-"

DIGITAL COMMUNICATION SYSTEMS
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021403	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	-	-	TA	:	10	
	-	-	-	CT	:	20	

Course Objectives:
The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Maintain basic digital communication systems**

CONTENTS: THEORY

Chapter	Name of the Topic	Hours
Unit 1	1.1 Blockdiagramandsub-systemdescriptionofadigitalcommunicationsystem. 1.2 Sampling of low-pass and band-pass signals, PAM, PCM, signal to quantizationnoiseratioanalysisoflinearandnonlinearquantizers. 1.3 Linecodes andbandwidthconsiderations;PCMTDMhierarchies. 1.4 framestructures,frame synchronization and bitstuffing.	**10**
Unit 2	2.1 Quantization noise analysis of DM and ADM. 2.2 DPCM and ADPCM. 2.3 Baseband transmission, matched filter,performanceinadditiveGaussiannoise. 2.4 Intersymbolinterference(ISI), Nyquist criterion for zero ISI, sinusoidal roll-off filtering. 2.5 correlative coding, equalizers and adaptive equalizers. 2.6 Digital subscriberlines.	**12**
Unit 3	3.1 Geometric representation of signals, Correlation receiver. 3.2 Generation, detection and probability of error analysis of OOK, BPSK, coherent and non-coherent FSK, QPSK and DPSK. 3.3 QAM, MSK and multicarrier modulation. 3.4 Comparison of bandwidth and bit rate of digital modulation schemes.	**12**
Unit 4	4.1 Introduction to Information and Coding Theories. 4.2 Information Theory: information measures, Shannon entropy, differential entropy, mutual information, capacity theorem for point-to point channels with discrete and continuous alphabets. 4.3 Introduction to channel coding, Linear Block Codes: Encoding and Syndrome Decoding.Introduction to: Hamming Codes, Cyclic Codes, CRC Codes, BCH Codes, Reed-Solomon Codes. 4.4 Convolutional Codes: Encoding andDecoding. 4.5 Turbo Codes: Turbo Encoding and Decoding. 4.6 Introduction to LDPC.	**14**
	TOTAL	**48**

References:

S. No.	Title of Book	Author	Publication
1.	Communication Systems	Haykin, S	4th Ed., John Wiley & Sons
2.	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl. 4th Ed., Oxford UniversityPress.
3.	Principles of Digital Communication: Signal Representation, Detection, Estimation and Information Coding	J. Das , S. K. Mullick and P.K. Chatterjee	New age Publisher
4.	Digital Communications	Proakis, J.G. and Saheli, M	5th Ed., McGraw-Hill
5.	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K.	2nd Ed., DorlingKindersley
6.	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley.
7.	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
8.	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall.

Course Outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above mentioned objective:

1. Analyze various error detection and correction codes in digital communication systems.
2. Use various pulse code modulation techniques.
3. Maintain systems based on digital modulation techniques.
4. Select suitable digital modulation technique in different applications.
5. Use information theory to determine channel capacity various channels.

Course Code: -2021403

Course Articulation Matrix:

Course code.CO number	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021403.1	Analyze various error detection and correction codes in digital communication systems.	3	2	2	-	1	1	-	1	1
C2021403.2	Use various pulse code modulation techniques.	3	3	2	1	1	1	1	2	1
C2021403.3	Maintain systems based on digital modulation techniques.	3	3	2	1	1	-	-	2	1
C2021403.4	Select suitable digital modulation technique in different applications.	3	3	2	1	1	1	1	2	2
C2021403.5	Use information theory to determine channel capacity various channels.	3	3	2	1	1	1	-	2	2
C2021403=average		**3**	**2.8**	**2**	**1**	**1**	**1**	**1**	**1.8**	**1.4**

Enter correlation levels 1, 2 or 3 as :- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), If there is no correlation, Then put "-"

ELECTRONICS EQUIPMENT MAINTENANCE
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021404	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	-	-	TA	:	10	
	-	-	-	CT	:	20	

Course Objectives:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Maintain the electronic Equipments/Gadgets/Appliance**

CONTENTS: THEORY

Chapter	Name of the Topic	Hours
Unit 1	**Fundamental Troubleshooting Procedures Inside An Electronic Equipment**: 1.1 Reading Drawings And Diagrams – Block Diagram, Circuit Diagram, Wiring Diagram. 1.2 Disassembly and reassembly of equipment, Equipment Failures and causes such as poor design, production deficiencies, careless storage and transport, inappropriate operating conditions. 1.3 Nature of faults, Fault location procedure, Fault finding aids – Service and maintenance manuals and instruction manuals. 1.4 Test and Measuring instruments, special tools Troubleshooting techniques, Approaching components for tests. 1.5 Grounding systems in Electronic Equipment, Temperature sensitive IntermittentproblemsCorrectiveactions,Situationswhererepairsshouldno t beattempted.	**11**
Unit 2	**Passive Components and Their Testing Passive Components-** 2.1 Resistors, Capacitors, Inductors Failures in fixed resistors. 2.2 Testing of resistors,variable resistors, variable resistors as potentiometers. 2.3 failures in potentiometers, testing of potentiometers, servicing potentiometers. 2.4 LDRs and Thermistors Types of capacitors and their performance, Failures in capacitors. 2.5 Testing of capacitors and precautions therein, variable capacitor types, 2.6 Testing of inductors and inductance measurement.	**10**
Unit 3	**Testing of Semiconductor Devices** 3.1 Types of semiconductor devices, Causes of failure in Semiconductor Devices. 3.2 Types of failure Test procedures for Diodes, special types of Diodes, Bipolar Junction Transistors. 3.3 Field Effect Transistors. 3.4 Thyristors Operational Amplifiers, Fault diagnosis in op-amp circuits.	**09**

Unit 4	**Logic IC families** 4.1 Packages in Digital ICs, IC identification, IC pin-outs, HandlingICs. 4.2 Digitaltroubleshootingmethods–typicalfaults,testingdigital ICs with pulse generators. 4.3 Logic clip, Logic Probe, Logic Pulser, Logic Current Tracer, Logic Comparator. 4.4 Special consideration for fault diagnosisin digital circuits Handling precautions for ICs sensitive to static electricity. 4.5 Testing flip-flops, counters, registers, multiplexers and de- multiplexers, encoders and decoders. 4.6 Tri-state logic.	**11**
Unit 5	5.1 Rework and Repair of Surface Mount Assemblies Surface Mount Technology and surface mount devices. 5.2 Surface Mount Semiconductor packages – SOIC, SOT, LCCC, LGA, BGA, COB, Flat packs and Quad Packs. 5.3 Cylindrical Diode Packages, Packaging of Passive Components as SMDs. 5.4 Repairing Surface Mount PCBs, Rework Stations.	**9**
	TOTAL	**50**

References:

S.No.	Title of Book	Author	Publication
1.	Modern Electronic Equipment: Trouble-shooting, Repair and Maintenance	Khandpur	TMH 2006
2.	Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting	R. G. Gupta	Tata McGraw Hill Edition 2001
3.	Student Reference Manual for Electronic Instrumentation Laboratories	David L Terrell	Butterworth-Heinemann
4.	Electronic Equipment and Maintenance	Siddharth Shankar	FPH
5.	Electronic Testing and Fault Diagnosis	G. C. Loveday, A. H	Wheeler Publishing

Course Outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned objective:

1. Select maintenance policy for equipment/appliances/gadgets.
2. Select troubleshooting tools for a specified work.
3. Maintain the electronic home appliances consumer electronics products.
4. Select digital troubleshooting method.
5. Rework and Repair of Surface Mount Assemblies

Course code 2021404

Course Articulation Matrix:

Course code.CO number	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
C2021404.1	Select maintenance policy for equipment/appliances/gadgets.	3	2	1	2	2	2	3	2	1
C2021404.2	Select troubleshooting tools for a specified work.	1	3	2	2	-	2	2	3	2
C2021404.3	Maintain the electronic home appliances consumer electronics products.	3	2	2	1	1	-	2	2	1
C2021404.4	Select digital troubleshooting method.	2	3	2	2	1	1	-	1	2
C2021404.5	Rework and Repair of Surface Mount Assemblies.	2	1	3	3	3	-	2	3	1
C2021404 (Average)		**2.2**	**2.2**	**2.6**	**2**	**1.75**	**1.67**	**2.25**	**2.2**	**1.4**

Enter correlation levels 1, 2 or 3 as :- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High),
If there is no correlation, Then put "-"

LINEAR INTEGRATED CIRCUITS
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021405	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	-	-	TA	:	10	
	-	-	-	CT	:	20	

Course Objectives:
The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

1. **Maintain electronics circuits consisting of Linear Integrated Circuits.**

CONTENTS: THEORY

Chapter	Name of the Topic	Hours
Unit 1	**IC Fabrication and Circuit Configuration for Linear IC** 1.1 Advantages of ICs over discrete components–Manufacturing process of monolithic ICs. 1.2 Construction of monolithic bipolar transistor, Monolithic diodes, Integrated Resistors, Monolithic Capacitors and Inductors. 1.3 Current mirrors**:** Simple, Wilson and Widlar current mirror circuits. Current sources as active loads. 1.4 BJT Differential amplifier.	**8**
Unit 2	**Applications Of Operational Amplifiers** 2.1 General operational amplifier stages and internal circuit diagrams of IC-741. 2.2 DC and AC performance characteristics, slew rate, CMRR, Open and closed loopConfigurations. 2.3 Sign Changer, Scale Changer, Linear Phase Shifter Circuits, Voltage Follower, V-to-I and I-to-V converters. 2.4 Adder, Subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier. 2.5 Comparators, Schmitt trigger, Precision rectifier, Peak detector, Clipper, Clamper, and Sample & Hold Circuits.	**10**
Unit 3	**Analog Multiplier and Phase Lock Loop** 3.1 Analog Multiplier using Emitter Coupled Transistor Pair -Gilbert Multiplier cell–Variable transconductance technique. 3.2 analog multiplier ICs and their applications. 3.3 Operation of the basic PLL, Closed loop analysis, Monolithic PLL IC-565, applications of PLL.	**8**

Unit 4	**Filters and Waveform Generators** 4.1 Introduction to filters: Active and Passivefilter and their ideal and practical responses. 4.2 Standard transfer functions of Biquad (second order filters). Realization of low-pass, high-pass, band-pass, band-reject and all-pass filters using Op-Amp. 4.3 Introduction to Oscillators, Sine-wave generators: Wein Bridge, R-C phase shift, Hartley, Colpitts, Clapp Oscillators. 4.4 Multivibrators and Square Wave Generator, Triangular wave generator, Saw-tooth wave generator.	**10**
Unit 5	**Special function ICs** 5.1 IC-566 Voltage Controlled Oscillator (VCO), Timer IC-555, IC Voltage regulators. 5.2 Three terminal fixed and adjustable voltage regulators–IC-723 general purpose regulator, Monolithic switching regulator. 5.3 Frequency to Voltage and Voltage to Frequency converters.	**8**
	TOTAL	**44**

References:

S.No.	Title of Book	Author	Publication
1.	Microelectronic Circuits (6th Edition)	Adel S Sedra& Kenneth Carless Smith	Oxford
2.	Electronic Devices and Circuit Theory	Robert Boylestad	Pearson
3.	Design with operational amplifiers and analogintegrated circuits, 3rd Edition	Sergio Franco	Tata McGraw-Hill, 2007
4.	Analysisand DesignofAnalog Integrated Circuits	Gray and Meyer	Wiley International, 2005.
5.	OP-AMP and Linear ICs	Ramakant A.Gayakwad	Prentice Hall / Pearson Education, 4th Edition, 2001
6.	Linear Integrated Circuits	Deepak Sinha	FPH (Foundation Publishing House)
7.	System design using Integrated Circuits	B.S.Sonde	NewAgePub,2ndEdition,2001

Course Outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned objective:

1. Describe the different IC fabrication technique and use Op-Amp in Linear Integrated Circuits.
2. Use various configurations of Op-Amp for different applications.
3. Troubleshoot various linear applications of Op-Amp for the given specification.
4. Maintain filters and oscillators used in various electronic circuits.
5. Troubleshoot specified applications using various linear ICs.

Course code 2021405
Course Articulation Matrix:

Course code.CO number	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021405.1	Describe the different IC fabrication technique and use Op-Amp in Linear Integrated Circuits.	3	-	-	3	-	1	1	2	-
C2021405.2	Use various configurations of Op-Amp for different applications.	3	-	-	3	-	1	1	2	-
C2021405.3	Troubleshoot various linear applications of Op-Amp for the given specification.	3	3	2	-	-	-	1	3	-
C2021405.4	Maintain filters and oscillators used in various electronic circuits.	3	1	-	3	-	1	1	2	-
C2021405.5	Troubleshoot specified applications using various linear ICs.	3	-	-	3	-	1	1	2	-
C2021405 (Average)		**3**	**2**	**2**	**3**	**-**	**1**	**1**	**2.2**	**-**

Enter correlation levels 1, 2 or 3 as:- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High),
If there is no correlation, Then put "-"

MICROCONTROLLER AND ITS APPLICATION LAB
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021406	Practical			Full Marks	:	50	Credits
	No. of Periods Per Week			ESE	:	50	01
	L	T	P/S	Internal(PA)	:	15	
	-	-	02	External(ESE)	:	35	

Course Objectives:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Maintain microcontroller based systems.**

CONTENTS: PRACTICAL

S. No.	Name of the Topic
1.	Programming 8051 Microcontroller using ASM and C, and implementation in flash 8051 Microcontroller.
2.	Programming with Arithmetic logic instructions [Assembly and C]
3.	Program using constructs (Sorting an array) [Assembly and C]
4.	Programming using Ports [Assembly and C]
5.	Delay generation using Timer [Assembly and C]
6.	Programming Interrupts [Assembly and C]
7.	Implementation of standard UART communication (using hyper terminal) [Assembly and C].
8.	Interfacing LCD Display [Assembly and C]
9.	Interfacing with Keypad [Assembly and C]
10.	Programming ADC/DAC [Assembly and C]
11.	Interfacing with stepper motor [Assembly and C]
12.	Pulse Width Modulation [Assembly and C]
13.	Interfacing with DC motor [Assembly and C]

References:

S.No.	Title of Book	Author	Publication
1.	The 8051 Micro Controller and Embedded Systems	MuhammadAliMazidi& Janice GilliMazidi, R.D.Kinely	PHI Pearson Education, 5th Indian reprint
2.	The 8051 Micro Controller architecture, programming and applications	Kenneth J. Ayala	Western Carolina University
3.	Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051	Soumitra Kumar Mandal	McGraw Hill Edu,
4.	Microcontrollers: Architecture implementation andProgramming	Tabak Daniel, Hintz Kenneth j	Tata McGraw Hill, 2007
5.	Microprocessors and interfacing: programming andhardware	Douglas V. Hall	Tata McGraw Hill, 2editon, 2007
6.	"Microcontroller Fundamentals and Applications withPic	Valder – Perez	Yeesdee Publishers, Tayler & Francis

Course outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned objective:

2. Examine architecture of microcontrollerICs.
3. Interpret the assembly language program by using 8051 Microcontroller for different operations.
4. Demonstrate the Interfacing of the memory and I/O devices to 8051 microcontroller.
5. Interpret C program using 8051 Microcontroller for interfacing ADC/DAC, UART (serial communication) and I/O devices.
6. Maintain microcontroller used in different applications.

Course Articulation Matrix (CAM)

Course Code: 2021406

Coursecode.C Onumber	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021406.1	Examine the architecture of microcontroller ICs.	3	1	1	-	-	-	-	-	-
C2021406.2	Interpret the assembly language program by using 8051 Microcontroller for different operations.	2	2	3	2	2	-	1	-	-
C2021406.3	Demonstrate the Interfacing of the memory and I/O devices to 8051 microcontroller.	1	2	2	3	2	-	1	-	-
C2021406.4	Interpret C program using 8051 Microcontroller for interfacing ADC/DAC, UART (serial communication) and I/O devices.	1	2	3	1	-	-	2	-	-
C2021406.5	Maintain microcontroller used in different application.	-	3	3	3	2	2	3	-	-
C2021406 (Average)		**1.75**	**2**	**2.4**	**2.25**	**2**	**2**	**1.75**	**-**	**-**

correlation levels 1, 2 or 3 as :- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High),
If there is no correlation, Then put "-"

DIGITAL COMMUNICATION SYSTEM LAB
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021407	Practical			Full Marks : 25			Credits
	No. of Periods Per Week			ESE	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	-	-	02	External(ESE)	:	18	

Course Objectives:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Maintain basic digital communication systems**

CONTENTS: PRACTICAL

Sl.No.	Name of Topic
1	Generation and Detection of Pulse Code Modulation and Differential Pulse Code Modulation.
2	Generation and Detection of Delta Modulation and Adaptive Delta modulation.
3	Simulation and Performance Analysis of Band Pass Signal Transmission and Reception using MATLAB • Amplitude ShiftKeying • Frequency ShiftKeying • Phase ShiftKeying.
4	Generation and Detection of QPSK signal using MATLAB
5	Implementation of Amplitude Shift Keying using Hardware
6	Implementation of Frequency Shift Keying using Hardware
7	Implementation of Phase Shift Keying using Hardware
8	Time Division Multiplexing: PLL (IC-565) based synch, clock and data extraction
9	Implement encoding and decoding of Linear Block Code using MATLAB.
10	Implement encoding and decoding of Convolutional Code using MATLAB.
11	Implement encoding and decoding of Turbo Code using MATLAB
12	Implement encoding and decoding of LDPC code using MATLAB

References:

S.No.	Title of Book	Author	Publication
1.	Communication Systems	Haykin, S	4th Ed., John Wiley& Sons
2.	Modern Digital and Analog Communication Systems	Lathi, B.P. and Ding, Z	Intl.4thEd.,OxfordUniversity Press.
3.	Digital Communications	Proakis,J.G.andSaheli,M	5th Ed., McGraw-Hill
4.	Digital Communication: Fundamentals and Applications	Sklar, B., and Ray, P.K	2nd Ed., Dorling Kindersley
5.	Elements of Information Theory	T. Cover and J. Thomas	2/e, Wiley.
6.	Principles of Digital Communication	R. G. Gallager	Cambridge Univ. Press
7.	A Foundation in Digital Communication	A. Lapidoth	Cambridge Univ. Press
8.	Error Control Coding	S. Lin and D. Costello	2/e, Prentice Hall.

Course Outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned objective:

7. Apply various error detection and correction codes in digital communicationsystems.
8. Examine various pulse code modulationtechniques.
9. Maintain systems based on digital modulationtechniques.
10. Investigate different shift keying methods.

Course Articulation Matrix (CAM)
Course Code: 2021407

Coursecode.C Onumber	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021407.1	Apply various error detection and correction codes in digital-communication systems.	3	1	1	-	-	-	-	-	-
C2021407.2	Examine various pulse code modulation techniques.	2	2	3	2	2	-	1	-	-
C2021407.3	Maintain systems based on digital modulation techniques.	1	2	2	3	2	-	1	-	-
C2021407.4	Investigate different shift keying methods.	1	2	3	1	-	1	2	-	-
C2021406 (Average)		**1.75**	**1.75**	**2.25**	**2.0**	**2**	**1**	**1.33**	**-**	**-**

Enter correlation levels 1, 2 or 3 as :
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, Then put "-"

LINEAR INTEGRATED CIRCUIT LAB
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021408	Practical			Full Marks : 25			Credits
	No. of Periods Per Week			ESE	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	-	-	02	External(ESE)	:	18	

Course Objectives:

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experiences:

- **Maintain electronics circuits consisting of Linear Integrated Circuits.**

CONTENTS: PRACTICAL

Sl .No	Name of the Topic
1.	a) Verify the open loop transfer characteristics of Op-Amp using IC- 741. Also determine gain of b) Inverting, c)Non-inverting and d) Buffer amplifier using IC-741on breadboard.
2.	Design Wein Bridge Oscillator using IC-741on bread board and determine the frequency of oscillation.
3.	Design Square wave generator using IC-741 and calculate the duty cycle of the generated waveform.
4.	Design an Astable Multivibrator using IC-555 Timer and calculate the duty cycle and pulse width of the generated waveform.
5.	Design aMonostable multivibrator using IC-555 Timer and calculate the pulse width of the generated waveform.
6.	Design a 2^{nd} order active low pass filter using IC741 Op-Amp
7.	Design a 2^{nd} order active high pass filter using IC741 Op-Amp.
8.	Design a 2^{nd} order active band pass filter using IC741 Op-Amp
9.	Design a 2^{nd} order active band reject filter using IC741 Op-Amp.
10.	Calculate the lock range and capture range of PLL using IC- 565.
11.	ConstructSample and Hold circuit using IC-741on bread board.

Course Outcomes:

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned objective:

1. Analyze and build Op-Amp circuits using IC-741 for linear and non-linear applications.
2. Analyze the frequency response of an Op-Amp in different modes of operation.
3. Analyze and design 2^{nd} order analog filters using Op-Amp.
4. Analyze and design oscillators for communication systems using Op-Amp.
5. Select suitable linear IC and design analog circuits to perform timing operation, frequency multiplication a voltage regulation.

Learning Task 2 (Individual Task)
Formulating Psychomotor Learning Outcomes

Course Outcomes	Experiment Title	Lab SessionLearning Outcomes
1. Analyze and build Op-Amp circuits using IC-741 for linear and non-linear applications. 2. Analyze the frequency response of an Op-Amp in different modes of operation. 3. Analyze and design 2nd order analog filters using Op-Amp. 4. Analyze and design oscillators for communication systems using Op-Amp. 5. Select suitable linear IC and design analog circuits to perform timing operation, frequency multiplication and voltage regulation.	1-a) Verify the open loop transfer characteristics of Op-Amp using IC- 741. Also determine gain of b) Inverting, c)Non-inverting and d) Buffer amplifier using IC-741on breadboard.	i. Select appropriate settings to calibrate the CRO. ii. Verify the required value of power supply output using CRO iii. a) Observe the open loop transfer characteristics on CRO. b) Compare the input and output waveforms on CRO and calculate the gain of inverting amplifier. c) Compare the input and output waveforms on CRO and calculate the gain of non-inverting amplifier. d) Compare the input and output waveforms on CRO and calculate the gain of buffer amplifier. iv. Sketch the output waveforms on butter paper from CRO screen. v. Follow safe practices while handling electronic equipments.
	2) Design Wein Bridge Oscillator using IC-741on bread board and determine the frequency of oscillation.	i. Select appropriate settings to calibrate the CRO. ii. Verify the required value of power supply output using CRO. iii. Select appropriate values of passive components required for condition of oscillation (CO) and frequency of oscillation (FO). iv. Connect the identified components to form Oscillator Circuit on breadboard. v. Observe the output waveform and find the frequency of oscillation. vi. Follow safe practices while handling electronic equipments.
	3) Design Square wave generator using IC-741 and calculate the duty cycle of the generated waveform.	i. Select appropriate settings to calibrate the CRO. ii. Verify the required value of power supply output using CRO. iii. Select appropriate values of passive components foroutput frequency. iv. Connect the identified components to form Square Wave generator circuit on breadboard. v. Observe the output waveform and find the frequency of oscillation. vi. Calculate the duty cycle of the waveform. vii. Follow safe practices while handling electronic equipments.
	4) Design an Astable Multivibrator using IC-555 Timer and calculate the duty cycle and pulse width of the generated waveform.	i. Select appropriate settings to calibrate the CRO. ii. Verify the required value of power supply output using CRO. iii. Select appropriate values of passive components foroutput frequency. iv. Connect the identified components to form Astable multivibrator circuit on breadboard. v. Observe the output waveform and find the frequency of oscillation. vi. Calculate the duty cycle and pulse width of the waveform. vii. Follow safe practices while handling electronic equipments.
	5) Design aMonostable multivibrator using IC-555 Timer and calculate the pulse width of the generated waveform.	i. Select appropriate settings to calibrate the CRO. ii. Verify the required value of power supply output using CRO. iii. Select appropriate values of passive components foroutput frequency. iv. Connect the identified components to form monostable multivibrator circuit on breadboard. v. Observe the output waveform and find the frequency of

Course Outcomes	Experiment Title	Lab SessionLearning Outcomes
		oscillation. vi. Calculate the pulse width of the waveform. vii. Follow safe practices while handling electronic equipments.
	6) Design a 2nd order active low pass filter using IC741 Op-Amp.	i. Select appropriate settings to calibrate the CRO and Function Generator. ii. Verify the required value of power supply output using CRO iii. Select appropriate values of passive components required for low pass filter iv. Connect the identified components to form low pass filter Circuit on breadboard. v. Plot the filter response and calculate the cut-off frequency of the low-pass filter. vi. Follow safe practices while handling electronic equipments
	7) Design a 2nd order active high pass filter using IC741 Op-Amp	i. Select appropriate settings to calibrate theCRO and Function Generator. ii. Verify the required value of power supply output using CRO iii. Select appropriate values of passive components required for high pass filter iv. Connect the identified components to form high pass filter Circuit on breadboard. v. Plot the filter response and calculate the cut-off frequency of the low-pass filter. vi. Follow safe practices while handling electronic equipments
	8) Design a 2nd order active band pass filter using IC741 Op-Amp.	i. Select appropriate settings to calibrate the CRO and Function Generator. ii. Verify the required value of power supply output using CRO iii. Select appropriate values of passive components required for band pass filter iv. Connect the identified components to form band pass filter Circuit on breadboard. v. Plot the filter response and calculate the cut-off frequency of the low-pass filter. vi. Follow safe practices while handling electronic equipments
	9) Design a 2nd order active band reject filter using IC741 Op-Amp.	i. Select appropriate settings to calibrate the CRO and Function Generator. ii. Verify the required value of power supply output using CRO iii. Select appropriate values of passive components required for band reject filter iv. Connect the identified components to form band reject filter Circuit on breadboard. v. Plot the filter response and calculate the cut-off frequency of the low-pass filter. vi. Follow safe practices while handling electronic equipments.
	10) Calculate the lock range and capture range of PLL using IC- 565	i. Select appropriate settings to calibrate the CRO and Function Generator. ii. Verify the required value of power supply output using CRO iii. Select appropriate values of passive components. iv. Connect the identified components to IC-565 to form PLL circuit. v. Observe the lock and capture range on CRO. vi. Follow safe practices while handling electronic equipments.
	11) ConstructSample and Hold circuit using IC-741on bread board.	i. Select appropriate settings to calibrate the CRO and Function Generator. ii. Verify the required value of power supply output using CRO

Course Outcomes	Experiment Title	Lab SessionLearning Outcomes
		iii. Select appropriate values of passive components. iv. Connect the identified components to IC-741 to form sample and hold circuit on breadboard. v. Observe the input and output waveform on the CRO. vi. Follow safe practices while handling electronic equipments.

References:

S.No.	Title of Book	Author	Publication
1.	Microelectronic Circuits (6th Edition) -	Adel S Sedra& Kenneth Carless Smith	Oxford
2.	Electronic Devices and Circuit Theory	Robert Boylestad	Pearson
3.	Analysis and Design of Analog Integrated Circuits	Gray and Meyer	Wiley International, 2005.
4.	OP-AMP and Linear ICs	Ramakant A. Gayakwad	Prentice Hall / Pearson Education, 4th Edition, 2001

Course Articulation Matrix (CAM)

Course Code: 2021408

Coursecode.C Onumber	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2021408.1	Analyze and build Op-Amp circuits using IC-741 for linear and non-linear applications.	3	2	1	3	-	-	-	-	-
C2021408.2	Analyze the frequency response of an Op-Amp in different modes of operation.	2	2	3	2	2	-	1	-	-
C2021408.3	Analyze and design 2nd order analog filters using Op-Amp.	3	2	2	3	2	-	1	-	-
C2021408.4	Analyze and design oscillators for communication systems using Op-Amp.	2	2	3	2	-	-	2	-	-
C2021408.5	Select suitable linear IC and design analog circuits to perform timing operation, frequency multiplication and voltage regulation.	3	3	3	3	2	2	3	-	-
C2021408 (Average)		**2.6**	**2.2**	**2.4**	**2.6**	**2**	**2**	**1.75**	**-**	**-**

Enter correlation levels 1, 2 or 3 as :
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, Then put "-"

MATLAB
(ELECTRONICS ENGINEERING GROUP)

Subject Code (2020409)	Practical			Full Marks : 25			Credits
	No. of Periods Per Week			ESE	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	-	-	02	External(ESE)	:	18	
	-	-	-	-	-	-	

Unit-1	**MATLAB Environment** 1.1 Introduction, MATLAB environment, MATLAB as a calculator, MATLAB Online, Syntax and Semantics, Help, Plotting. 1.2 Matrices and Operators: Introduction, the Colon Operator, Accessing Parts of a Matrix, Combining and Transforming Matrices. 1.3 Arithmetic Part 1, Arithmetic Part 2, Operator Precedence.
Unit-2	**Functions:** 2.1 Introduction, Function I/O, Formal Definition of Functions, Sub Functions. 2.2 Scope. 2.3 Advantages of Functions, Scripts, a Problem Solving.
Unit-3	**Programmer's Toolbox:** 3.1 Introduction, Matrix Building, Input-Output, Plotting, Debugging. 3.2 Selection: Selection,If– Statements, Relational and Logical Operators, Nested if– Statements. 3.3 Variable Number of Function Arguments, Robustness, Persistent Variables.
Unit-4	**Loops:** 4.1 For -Loops While – Loops, Break Statements, Logical Indexing. 4.2 Data Types Introduction, Strings, Structs, Cells.
Unit-5	**File Input / Output:** 5.1 I/O, Excel Files, Text Files, Binary Files. 5.2 Applications of MATLAB inElectrical Machine, Power system, Control System and Power Electronics.
Unit-6	**Simulink :** 6.1 Getting Started, Simulink Library Browser. 6.2 Connections, Block Specification. 6.3 Toolboxes, Building Systems, Applications.

List of Practicals:

1.	Basic Operations on Matrices.
2.	Generate various elementary pulses (like rectangular, square, triangular, trapezoidal and sin).
2.	Generation of Various Signals such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc etc.

3.	Operations on signals and sequences such as addition, multiplication, scaling, shifting, folding,Computation of energy and average power.
4.	Mesh and Nodal analysis of electrical circuits.
5.	Application of network theorems such as Thevenin's, Norton's, Superposition etc. to electrical networks.
6.	Locating Zeroes and poles and plotting the pole-zero maps in S plane and for the given TF.
7.	Simulation of DC circuits.
8.	Measurement of Active power of three phase circuit for balanced loads.
9.	Simulation of single-phase diode bridge rectifiers with filter for R and RL loads.

References / Text Books:

1. Books
   (i) Computer Programming with MATLAB by J. Michael Fitzpatrick and AkosLedeczi
   (ii) Getting Started with MATLAB : A Quick Introduction for Scientists and Engineers by RudraPratap
2. Video Lectures (Web Links):
   (1) https://ocw.mit.edu/courses/mathematics/18-s997-introduction-to-matlab-programming.fall2011/index.html
   (2) https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-094-introduction-tomatlab-january-jjap-2010/index.html.
   (3) https://in.mathworks.com/vidoes/getting-started-with-matlab-68985.html.
   (4) https://www.mathworks.com/examples/
   (5) https://www.coursera.org/learn/matlab

Course Outcomes:

1. Togeneratethe sinewaveusingMATLAB.
2. TogeneratetheimpulsesignalusingMATLAB.
3. To find the displacement andpressure using LVDT and Bellows.
4. To find the Frequency responseof capacitive Transducer

Course Articulation Matrix (CAM)
Course Code: 2020409

Coursecode.COnumber	COStatement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C2020409.1	Togeneratethe sinewaveusingMATLAB.	3	1	1	2	1	-	1	2	1
C2020409.2	Togeneratetheimpulsesignalusing MATLAB.	3	2	2	2	2	2	2	2	2
C2020409.3	To find the displacement and pressure using LVDT and Bellows.	2	1	2	2	1	1	2	2	1
C2020409.4	To find the Frequency response of capacitive Transducer.	3	2	2	1	1	-	1	2	1
C2020409(Average)		**3**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**2**

Enter correlation levels 1, 2 or 3 as :
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, Then put "-"

ESSENCE OF INDIAN KNOWLEDGE AND TRADITION (TW)
(ELECTRONICS ENGINEERING GROUP)

Subject Code 2021410	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	-	-	02	External(ESE)	:	18	
	-	-	-	-	-	-	

Course Content:

Basic Structure of Indian Knowledge

(i) वेद, (ii) उन्नवेद (आयुवेद, धनुवेद, गन्धवेद, स्थान्नत्य आदद) (iii) वेदांग (शिक्षा, कल्न, ननरुत, व्याकरण, ज्योनतष छांद), (iv) उन्नाइग (धर्म ास्त्र, रीशांसा, न्नुराण, तकमिास्त्र)

- Modern Science and Indian Knowledge
- System Yoga and Holistic Health care

System:

- Case Studies.

References:

S.No.	Title of Book	Author	Publication
1.	Cultural Heritage of India- Course Material	V. Sivaramakrishna	Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2.	Modern Physics and Vedant	Swami Jitatmanand	Bharatiya Vidya Bhavan
3.	The web of Life	Fritzof Capra	
4.	Tao of Physics	Fritzof Capra	
5.	Tarkasangraha of Annam Bhatta, Inernational	V N Jha	Chinmay International Foundation, Velliarnad, Amakuam
6.	Science of Consciousness Psychotherapy and YogaPractices	R N Jha	VidyanidhiPrakasham, Delhi, 2016

MICROPROCESSORS AND ITS APPLICATION LAB (TW)

Subject Code (2021411)	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal(PA)	:	07	
	-	-	02	External(ESE)	:	18	
	-	-	-	-	-	-	

CONTENTS: PRACTICAL

Intellectual Skills:

1. Logical development
2. Programmingskills

Motor Skills:

1. Dataentry,ErrorCorrectionandExecutionofassemblylanguageprograms
2. ConnectionSkills

List ofPractical's:

Using microprocessor 8085 kit:

a. Demonstration and study of microprocessorkit
b. Programforadditionofandsubtractionoftwohexadecimalnumbers
c. Program for finding largest / smallestnumber
d. Programforarrangingnumbersinascending/descendingorder
e. Program for 16-bitaddition
f. Program for datamasking
g. Programformultiplicationoftwoeight-bitnumbers
h. Program using JMPInstruction
i. Two programsusing

Loop.

MINOR PROJECT(TW)

Subject Code 2021412	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal(PA)	:	15	
	-	-	04	External(ESE)	:	35	
	-	-	-	-	-	-	

BLOCK CHAIN THROUGH MOOCS / SWAYAM / OTHERS (TW)

Subject Code (2021413)	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal (PA)	:	07	
	-	-	02	External(ESE)	:	18	
	-	-	-	-	-	-	