MANNAR THIRUMALAI NAICKER COLLEGE

PASUMALAI, MADURAI– 625 004

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

(Re-accredited with 'A' Grade by NAAC)

B.Sc., Electronics and Communication

SYLLABUS AND REGULATIONS

UNDER
CHOICE BASED CREDIT SYSTEM (CBCS)
(For those who joined during 2018-2019 and after)

Eligibility for Admission

Candidates seeking admission to the B.Sc (E&C) Degree course must have the Higher Secondary Education, (should have studied Physics or Mathematics in HSC) of the Government of Tamil Nadu or any other state or its equivalent qualification.

Duration of the course

The duration of the course shall be three academic years comprising six semesters with two semesters in each academic year.

Subject of Study

Part I: Tamil

Part II: English

Part III:

1. Core Subjects
2. Allied Subjects
3. Electives

Part IV :

1. Non Major Electives
2. Skill Based Subjects
3. Environmental Studies
4. Value Education

Part V :

Extension activities

The scheme of Examination

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks
Total	--25 marks

Pattern of the questions paper for the continuous Internal Assessment

(For Part I, Part II, Part III , NME & Skilled Paper in Part IV)

The components for continuous internal assessment are:

Part –A

Six multiple choice questions (answer all) 6 x01= 06 Marks

Part –B

Two questions (‘either …. or ‘type) 2 x 07=14 Marks

Part –C

One question out of two 1 x 10 =10 Marks

Total 30 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions 10 x01 = 10 Marks

(No Unit shall be omitted; not more than two questions from each unit.)

Part –B

Five Paragraph questions (‘either …. or ‘type) 5 x 07 = 35 Marks

(One question from each Unit)

Part –C

Three Essay questions out of five 3 x 10 =30 Marks

(One question from each Unit)

Total 75 Marks

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	--15 marks
Project Report	--10 marks*
Total	--25 marks

** The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

Part –A

(Answer is not less than 150 words)

Four questions (‘either …. or ‘type) 4 x 05=20 Marks

Part –B

(Answer is not less than 400 words)

One question (‘either …. or ‘type) 1 x 10=10 Marks

Total 30 Marks

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

Part –A

(Answer is not less than 150 words)

Five questions (either or type) 5 x 06 =30 Marks

(One question from each Unit)

Part –B

(Answer is not less than 400 words)

Three questions out of Five each unit (One question from each Unit) 3 x 15 = 45 Marks

Total 75 Marks

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).

No separate pass minimum for the Internal Examinations.

27 marks out of 75 is the pass minimum for the Summative Examinations.

PROGRAM EDUCATIONAL OUTCOMES

PEO1: To enhance the entrepreneurial abilities and research initiatives through experimental learning practices and building self-confidence.

PEO2: Utilize the concepts of Electronics and Communication to get placement in various electronic based Industries.

PEO3: To grasp with a wide range of experimental skills and soft skills to create a own project.

PEO4: Ability to work in any places with his/her research ideas and ethical challenges in multi-disciplinary environment.

PROGRAM OUTCOMES

PO1: Utilize the basic concepts of Electricity and Circuits.

PO2: Identify, formulate and solve any technical issues in electronic equipment.

PO3: Design and servicing, Troubleshooting the Electronic equipment.

PO4: Communicate effectively to comprehend and write reports and documentation.

PO5: Perform effectively as a member/Leader in various roles.

PO6: Develop consciousness of professional, ethical and social responsibilities as experts in the field of Electronics and Communication.

PO7: Demonstrate knowledge and understanding of Electronics and communication concepts to create own project.

PROGRAMME SPECIFIC OUTCOMES

PSO1: To improve hardware and software skills inembedded system and Industrial Automation.

PSO2: To train the students to design and troubleshoot electrical equipments.

PSO3: To enrich the knowledge of students through technical communication which is used widely today.

PSO4: To enrich the knowledge of Bio-Medical instrumentation enables the student to fetch job in Bio-Medical field.

COURSE PATTERN

Study component	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total hours	Total credit	No. of course	Total marks
Part I Tamil	6(3)	6(3)	6(3)	6(3)			24	12	04	400
Part II English	6(3)	6(3)	6(3)	6(3)			24	12	04	400
Part III										
Core subjects	4(4)	4(4)	4(4) 4(4)	6(6)	4(4) 5(4)	5(5) 5(5)	41	40	9	900
Elective subjects	2(2)	2(2)			5(4)	4(4)	13	12	04	400
Core subjects(P)	2(0)	2(4)	2(0)	2(3) 2(3)	3(0) 3(0) 2(0)	3(4) 3(3) 2(4)	26	21	06	600
Allied subjects	4(4)	4(4)	4(4)	6(4)			18	16	04	400
Allied subjects(P)	2(0)	2(3)	2(0)		4(0)	4(3)	14	6	02	200
Part IV Skilled based subject	2(2)	2(2)			2(2) 2(2)	2(2) 2(2)	12	12	06	600
Non Major Elective			2(2)	2(2)			4	4	02	200
EVS/VE	2(2)	2(2)					4	4	02	200
Part V										
Extension activities				0(1)			0	01	01	100
Total	**30 (20)**	**30 (27)**	**30 (20)**	**30 (25)**	**30 (16)**	**30 (32)**	**180**	**140**	**44**	**4400**

SEMESTER-I

Subject code	Title of the Paper	No. of Courses	Hours / week	credits	Maximum marks		
					Int	Ext	total
18UTAG11	**பகுதி-I: தமிழ்** **தற்கால கவிதையும் உரைநடையும்**	1	6	3	25	75	100
18UENG11	English-I: Exploring Language Through Literature-1	1	6	3	25	75	100
18UELC11	**Part-III Core Subject** Electronic Devices	1	4	4	25	75	100
18UELA11	**Part-III Allied Subject** Basic electricity and circuits	1	4	4	25	75	100
18UELE11	**Part-III Elective Subject** Electronic Instrumentation	1	2	2	25	75	100
18UELS11	**Part-IV Skilled Subject** Introduction to Computer Application	1	2	2	25	75	100
18UEVG11	**Part-IV Mandatory Subject** Environmental Studies	1	2	2	25	75	100
18UELCP1	**Part-III Core Subject (P)** Electronic Devices and Circuits – Lab	-	2	-	-	-	-
18UELAP1	**Part-III Allied Subject (P)** **Basic Electricity and circuits Lab**	-	2	-	-	-	-
	Total	**7**	**30**	**20**	**175**	**525**	**700**

SEMSTER-II

18UTAG21	**பகுதி-I தமிழ் பக்தி இலக்கியமும் நாடகமும்**	1	6	3	25	75	100
18UENG21	English-II: Exploring Language Through Literature-II	1	6	3	25	75	100
18UELC21	**Part-III Core Subject** Electronic Circuits	1	4	4	25	75	100
18UELE21	**Part-III Elective Subject** Electronic Communication Systems	1	2	2	25	75	100
18UELA21	**Part-III Allied Subject** Allied Mathematics	1	4	4	25	75	100
18UELS21	**Part-IV Skilled Subject** Opto Electronics	1	2	2	25	75	100
18UVLG21	**Part-IV Mandatory Subject** Value Education	1	2	2	25	75	100
18UELCP1	**Part-III Core Subject (P)** Electronic Devices and Circuits - Lab	1	2	4	40	60	100
18UELAP1	**Part-III Allied Subject (P) Basic Electricity and circuits Lab**	1	2	3	40	60	100
	Total	**9**	**30**	**27**	**255**	**645**	**900**

SEMSTER-III

Subject code	Title of the Paper	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG31	**Part-I Tamil Subject** காப்பிய இலக்கியமும் சிறுகதையும்	1	6	3	25	75	100
18UENG31	**Part-II English Subject** Exploring Language Through Literature-III	1	6	3	25	75	100
18UELC31	**Part-III Core Subject** Digital Electronics	1	4	4	25	75	100
18UELC32	**Part-III Core Subject** Linear Integrated Circuits	1	4	4	25	75	100
18UELA31	**Part-III Allied Subject** Programming in C	1	4	4	25	75	100
18UELCP2	**Part-III Core Subject (P)** Digital Electronics - Lab	-	2	0	-	-	-
18UELAP2	**Part-III Core Subject (P)** Linear Integrated Circuits – Lab	-	2	0	-	-	-
18UELN31	**PART-IV NME** Microprocessor - 8085	1	2	2	25	75	100
	Total	**6**	**30**	**20**	**150**	**450**	**600**

SEMESTER-IV

Subject code	Title of the Paper	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG41	**Part-I Tamil Subject** பழந்தமிழ் இலக்கியமும் புதினமும்	1	6	3	25	75	100
18UENG41	**Part-II English Subject** Exploring Language Through Literature-IV	1	6	3	25	75	100
18UELC41	**Part-III Core Subject** Analog and Digital Communication Systems	1	6	6	25	75	100
18UELA41	**Part-III Allied Subject** Numerical Methods	1	6	4	25	75	100
18UELCP2	**Part-III Core Subject(P)** Digital Electronics - Lab	1	2	3	40	60	100
18UELAP2	**Part-III Core Subject (P)** Linear Integrated Circuits – Lab	1	2	3	40	60	100
18UELN41	**PART-IV NME** Mobile Communication	1	2	2	25	75	100
18UEAG40 - 18UEAG49	**Part-V** Extension activities	1	-	1	100	-	100
	Total	**8**	**30**	**25**	**305**	**495**	**800**

SEMSTER-V

Subject code	Title of the Paper	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UELC51	**Part-III Core Subject** Microprocessors and Interfacing	1	4	4	25	75	100
18UELC52	**Part-III Core Subject** Sensors and Transducers	1	5	4	25	75	100
	Part-III Elective Subject	1	5	4	25	75	100
18UELE51	**Internet of Things**						
18UELE52	Industrial and Power Electronics						
18UELE53	Mobile Communication						
18UELS51	**Part-IV Skilled Subject** Fiber Optic Communication	1	2	2	25	75	100
18UELS52	**Part-IV Skilled Subject** Bio-Medical Instrumentation	1	2	2	25	75	100
18UELCP3	**Part-III Core Subject(P)** Communication - Lab	-	3	0	-	-	-
18UELAP3	**Part-III Allied Subject(P)** Sensors and Transducers - Lab	-	4	0	-	-	-
18UELCP4	**Part-III Core Subject(P)** Microprocessors and Microcontroller - Lab	-	3	0	-	-	-
18UELPR1	**Part-III Project** Project	-	2	0	-	-	-
	Total	**5**	**30**	**16**	**125**	**375**	**500**

SEMESTER-VI

Subject code	Title of the Paper	No. of Courses	Hours / week	Credits	Maximum Marks		
					Int	Ext	Total
18UELC61	**Part-III Core Subject** Microcontroller 8051 and Embedded Systems	1	5	5	25	75	100
18UELC62	**Part-III Core Subject** Digital Signal Processing	1	5	5	25	75	100
	Part-III Elective Subject						
18UELE61	**Industrial Automation**	**1**	**4**	**4**	**25**	**75**	**100**
18UELE62	Antenna and Wave Propagation						
18UELE63	Microwave and Radar Systems						
18UELS61	**Part-IV Skilled Subject** Computer Networks	1	2	2	25	75	100
18UELS62	**Part-IV Skilled Subject** Television Systems	1	2	2	25	75	100
18UELCP3	**Part-III Core Subject(P)** Communication - Lab	1	3	4	40	60	100
18UELAP3	**Part-III Allied Subject(P)** Sensors and Transducers-Lab	1	4	3	40	60	100
18UELCP4	**Part-III Core Subject(P)** Microprocessors and Microcontroller - Lab	1	3	3	40	60	100
18UELPR1	**Part-III Project** Project	1	2	4	40	60	100
	Total	**9**	**30**	**32**	**285**	**615**	**900**

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Programme	**: B.Sc.(E&C)**	**Part III**	**: Core**
Semester Code	**: V**	**Hours**	**: 04**
Subject Code	**: 18UELC51**	**Credit**	**: 04**

MICROPROCESSORS AND INTERFACING

Course Outcomes:

On successful completion of this course, the students will be able:

CO 1: Understand the basic architecture of 8085 and 8255 PPI.

CO 2: Classify different addressing modes and instructions set.

CO 3: Apply microprocessor instructions to develop assembly languages programs.

CO 4: Analyze the concept of advanced microprocessors.

CO 5: Select the interfacing devices with microprocessors.

CO 6: Design and develop interfacing programs with microprocessors.

Unit: I

ARCHITECTURE OF 8085 MICROPROCESSOR: Functional block diagram – Registers- ALU- Bus systems- Timing and control signal- machine cycles.

Unit: II

PROGRAMMING 8085: Instruction formats – Addressing modes – Instruction set – Need for Assembly language – Development of Assembly language program.

Unit: III

INTERFACING CONCEPTS: Peripherals I/O instruction –Device selection and data transfer- Input interfacing;– Interfacing memory- Bus contention - Time and wait states.

Unit: IV

THE 8255 PROGRAMMABLE PERIPHERAL INTERFACING (PPI): Peripheral interfacing block diagram 8255A and the modes, Simple input and output. BSR mode – Programming the 8255A in Mode1 and 2 -Bidirectional data transfer.

BLOCK DIAGRAM OF 8253: Programming 8253 – The 8253 as a counter – 8279 keyboards, display controller.

Unit: V

ADVANCED MICROPROCESSORS: Introduction - The 80286 microprocessor -The 80386 microprocessor – The 80486 microprocessor – The Pentium microprocessor.

Text Books:

1. Goankar R.S... "Microprocessor Architecture Programming And Application With 8085/8086A" III Edition, Penram International Publishing House, 1997
2. DouglusV.Hall, "Microprocessor & Interfacing Programming and Hardware" McGraw Hill Inc, New Delhi, 1992.

Reference Books:

1. A.P. Mathur. "**Introduction to Microprocessor**", III Edition, TMH 2004.
2. N.Mathivanan. "**Microprocessors, PC hardware and interfacing**", Prentice Hall of India, New Delhi, 2005.

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Programme	**: B.Sc. (E&C)**	**Part III**	**: Core**
Semester	**: V**	**Hours**	**: 05**
Sub code	**: 18UELC52**	**Credits**	**: 04**

SENSORS AND TRANSDUCER

Course Outcomes:

On successful completion of this course, the students will be able:

CO 1: Remembering the concept of a transducer
CO 2: Understand the principle of displacement and strain gauge techniques
CO 3: Identify the concept of pressure sensors.
CO 4: Classify types of flow meters.
CO 5: Evaluate force and torque of sensors and transducers
CO 6: Improve the concepts of different measuring techniques.

UNIT-I

Transducer Classification and Temperature

Introduction-Electrical transducer-classification-basic requirement

Temperature

Introduction-mechanical temperature sensors-resistive type-platinum resistance thermometer-thermistors- Quartz thermometer-radiation method-optical pyrometer

UNIT-II

Displacement and strain

Principle of transduction-digital transducer-level measurements

Strain

Introduction-factors affecting strain measurement-types of strain gauge-theory of operation of resistance strain gauge-types of electrical strain gauge-gauge techniques and other factors

UNIT-III

Vibration and pressure

Introduction -characteristics- analysis of Vibration sensing device-Vibration Sensing devices-Signal conditioners-Shock measurement.

Pressure

Introduction-Diaphragms-Piezoelectric pressure transducer-vibrating element pressure sensors

UNIT-IV

Flow

Introduction-classification-head type flow meter- rota meter -electromagnetic flow meter-mechanical flow meter-Anemometer-ultrasonic flow meter.

UNIT-V

Force and Torque

Introduction - force measuring sensor-load cell elastic transducer-digital force transducer-hydraulic load cell-electronic weighting system-torque measurement.

Text Book:

1. C.S.Rangan,G R Sharma VSV Mani"**Instrumentation Devices & Systems**, Tata M c Graw Hill publishing company private ltd, Delhi II edition,

   Chapter 2 and 9: 2.1 to 2.4, 9.1, 9.3to 9.7, 9.9 to 9.11
   Chapter 4 and 5 :4.1 to 4.4,5.1 to 5.7
   Chapter 6 and 7 :6.1 to 6.6,7.1-7.2,7.8-7.9
   Chapters 8: 8.1-8.8
   Chapter 10: 10.1to10.9

Reference Books:

1. D.Patranabi, **Sensors and Transducers**, PHI Learning Pvt.Ltd, New Jersey,Second Edition,2003.
2. Lan Sinclair, **Sensors and Transducers,**Newnes, Copyright, Oxford University, U.K, Third Edition

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Programme	**: B.Sc. (E&C)**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 05**
Sub code	**: 18UELE51**	**Credits**	**: 04**

INTERNET OF THINGS

Course Outcomes:
On successful completion of this course, the students will be able:
CO1: Remember the concepts of Internet of Things.
CO2: Understand the basic design principles for IoT.
CO3: How to apply enterprises plan for IoT deployment in networks.
CO4: Compare skills on IoT Systems like Python Packages and Raspberry pi.
CO5: Importance of basic IoT applications on embedded platform.

UNIT- IIntroduction to Internet of Things:

Definition and Characteristics of IoT ; Physical Design of IoT -Logical Design of IoT; IoT Enabling Technologies- IoT Levels and Deployment Templates Domain Specific IoTs: Home Automation, Smart Cities, and Industry Automation-Gateway

UNIT II Design Principles:

for Connected Devices IoT/M2M systems layers and designs standardization; Communication technologies -Data enrichment, -Data consolidation and device management at gateway

Design Principles for Web Connectivity Web communication protocols for connected devices; Message communication protocols for connected devices -Web connectivity for connected-devices network using gateway, SOAP, REST, HTTP, Web Sockets-Artificial intelligence.

UNIT III Internet Connectivity Principles:

Internet connectivity; Internet based communication; IP addressing in the IoT; Media access control

Application layer protocols: HTTP; HTTPS; FTP; Telnet and others

Data Acquiring, Organizing, Processing and Analytics Data acquiring and storage; organizing the data; Transactions, Business processes, Integration and enterprise systems

UNIT IV Programming Language in IOT:

IoT Systems-Logical Design using Python Python Data Types and Data Structures; Control Flow; Functions -IoT Physical Devices and Endpoints An IoT Device; Raspberry Pi; About the Board; Linux on Raspberry Pi

Text Books

1. ArshdeepBahga, Vijay Madisetti, "**Internet of Things**: A Hands-On Approach", Orient Blackswan Pvt. Ltd., First edition, 2015.
2. B. Raj Kamal, "**Internet of things Architecture and design principles**", McGraw Hill Education Pvt. Ltd., First edition, 2017.

Reference Books:

1. Hanes David, Salgueiro Gonzalo, Grossetete Patrick, Barton Rob, Henry Jerome, *"IoT*Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things", Pearson Education, First edition, 2017.
2. B. RajkumarBuyya, Amir VahidDastjerdi, "Internet of Things Principles and Paradigms", Elsevier-Todd Green, 2016
3. C. Pethuru Raj, Anupama C. Raman, "The Internet of Things Enabling Technologies, Platforms, and Use Cases", CRC Press-Taylor & Francis Group, 2017
4. D. Charles Bell, "MySQL for the Internet of Things", Apress, First edition, 2016. E. http://nptel.ac.in/courses/106105166/

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Semester	**: V**	**Hours**	**: 05**
Sub code	**: 18UELE52**	**Credits**	**: 04**

INDUSTRIAL AND POWER ELECTRONICS

Course Outcomes:

On successful completion of this course, the students will be able:

CO 1: Identify basic requirements for power electronics based design applications.
CO2: Understanding the knowledge about power devices.
CO 3: Identify single and three phase inverters and cycloconverters.
CO 4: Classify different power converters and control with their applications.
CO 5: Design and develop various power electronic circuits for industrial applications.

Unit -I: Power Devices and its Applications in Power Control:

Power Transistors: MOSFET;MCB,MCCB,SSR,IGBT-Types of power electronic circuits- Thyristor turn-on methods- Thyristor protection: Design of Snubber circuits- Over voltage protection- Over current protection; Gate protection-UPS- HVDC-Types of HVDC link. Static switches- StaticCircuit. Breakers.

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Unit- II: Converters and Commutation Techniques

Principle of phase-controlled converter: Single phase full converters. Single- phase dual converters. Three-phase full converters - Introduction to Commutation: Class A, Class B, Class C, Class D, Class E and Class F

Unit :IIIInverters and Cyclo Converters

Inverters: Operating principle; Single-phase bridge inverter. Three-phase bridge inverter; Three-phase 180° mode VSI.

Pulse width modulated inverters: Single-pulse modulation; Multiple-pulse modulation.
Sinusoidal-pulse Modulation (SPWM); Realization of PWM in single phase bridge inverters. Cycloconverters: Single-phase Cycloconverters. Three-phase Cycloconverters.

Unit -IV: Choppers:

DC choppers- principle of chopper operation- Step-Up choppers-Types of chopper circuits Switching Regulator: Buck regulator-Boost regulator-Buck-Boost regulatorUninterruptible power supply (UPS).

Unit V:Thyristors Industrial Application:

Automatic water level indicator using SCR, Automatic battery charger using SCR, Automatic street lighting circuit using LDR and SCR. Emergency light using SCR. Burglar alarm using SCR.

Text Books:

1. P. S. Bimbhra, "Power Electronics", Khanna Publishers, Fourth Edition, 2011.
2. B. S. K. Bhatacharya, S. Chattejee, "Industrial Electronics and Control", Tata McGraw Hill, Reprint 2011.
3. C. Muhammad Rashid, "Power electronics, Circuits, Devices & Applications", Prentice Hall Edition, Third Edition, 2004.

References Books:

1. Gyanendra K. Mithal, "Industrial and Power Electronics", Khanna Publishers, 19th Edition, 2001.
2. B. http://nptel.ac.in/courses/108101038

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Title of the Paper	**: B.Sc. (E&C)**	**Part III**	**: Elective**
Semester	**: V**	**Hours**	**: 05**
Sub code	**: 18UELE53**	**Credits**	**: 04**

MOBILE COMMUNICATION

Course Outcomes:

On successful completion of this course, the students will be able:

CO1: Remember the modulation techniques and elements of communication system.
CO2: Summarize different technic in mobile communication.
CO3: Identify the concepts of GSM and multiple access techniques.
CO4: classify various types of spectrum techniques.
CO5: Importance of mobile satellitesand GPS.

Unit- I

Modulation Techniques: Introduction about Communication, Signal and their Classification, analog and Digital signal, Elements of communication system.

Unit-II

Mobile Communication Introduction : Cell Mobile Telephone system – Tuning efficiency – Frequency reuse concept – Co-channel interference reduction – Hand-off mechanism – Frequency spectrum utilization – Cell splitting**.**

Unit- III

Digital Cellular Systems: Digital speech – Group of special mobile (GSM) – Multiple access techniques (TDMA, FDMA, CDMA).

Unit- IV

Spectrum**:** Introduction – 2G -3G -4G – 5G.

Unit - V:

Mobile Satellites**:** Architecture –Orbits-Constellation –Classification –GPS.

Text Book:

1. V. JeyasriArokiamary, **Mobile Communication**, Technical Publications, Pune, First Edition, 2009.
2. Simon Haykin, **An Introduction to Analog and digital Communications**, John Wiley and Sons (Asia) Pvt.Ltd, Singapore,1989.

Reference Books:

1. The OdoreS.Rappaport, **Wireless Communications,** Prentice Hall of India Private Limited, New Delhi, 2nd edition, 2003.
2. Jochen Schiller, **Mobile Communications**, an Imprint of Pearson Education, New Delhi, Second Edition, 2003

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Title of the Paper	**: B.Sc. (E&C)**	**Part IV**	**: Skill**
Semester	**: V**	**Hours**	**: 02**
Sub code	**: 18UELS51**	**Credits**	**: 02**

FIBER OPTIC COMMUNICATION

Course Outcomes:

On successful completion of this course, the students will be able:

CO1: Remember the theory of fiber optic communication.
CO2: Describe the different characteristics of optical fiber.
CO3: Operation of different types of optical sources
CO4: Classify the different types of optical detector.
CO5: Importance of an optical fiber system.
CO6: Prepare the data communication through FOC Cable.

Unit-IFundamentals of optic fiber:

Block diagram of general communication system-comparison with other communication system-Different types of optical fiber application.

Unit-IITheory of transmission:

Total internal reflection-Acceptance angle –Numerical aperture-Skew rays, Phase and group velocities, mode coupling-Fiber Bend losses.

Unit-IIIOptical Sources:

Absorption and emission of radiation-population inversion-optical feedback and laser oscillation- Threshold condition optical emission from semiconductors.

Unit-IVOptical detector:

Device types, optical detector principles-P-I-N photo diode, Avalanche Photo diode.

Unit-VOptical Fiber System:

Optical transmission circuit, optical receiver circuit, Analog and Digital system, Different multiplexing techniques.

Text Books:

1. John M.Senior," **Optic Fiber Communication**." Pearson Education, New Delhi,India,First Edition,2009.
2. N.Sharma,TataMcGraw Hill "**FiberOptc in Telecommunication**."TataMcGraw Hill, New Delhi, First Edition, 2003.

Reference Book:

1. G.Keiser,**Optical Fiber Communication**,TMH.Ltd,New Delhi,First Edition,2010.
2. S.C.Gupta,**Optical fiber Communication and its Application**, PHI Learning Pvt. Ltd, New Delhi, First Edition,2004.
3. Dr.M.Arumugam,**Optical Communication**,Anuradha Publication.

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Title of the Paper	**:B.Sc(E&C)**	**Part IV**	**: Skill**
Semester	**: V**	**Hours**	**: 02**
Sub code	**: 18UELS52**	**Credits**	**: 02**

BIO- MEDICAL INSTRUMENTATION

Course Outcomes:

On successful completion of this course, the students will be able:

CO1: Identify various Bio – potential and their specifications in terms of amplitude and frequency.

CO2: Understand the concept of biomedical recorders and patients monitoring systems.

CO3: Use of the therapeutic instruments for treatment purpose.

CO4: Analyze various factors of Bio electric signals and electrodes.

CO5: Importance of modern imaging instruments.

Unit: I BIOPOTENTIALS:

Cellular fluids-Transmembrane potential- action and resting potentials-Physiological transducers, Biosensors, Smart sensors.

Unit: II BIOELECTRIC SIGNALS AND ELECTRODES:

Origin of bioelectrical signals – Recording electrodes – Skin contact – Impedance – Electrodes for ECG – EMG and EEG – Electrical conductivity of electrodes- jellies creams microelectrodes.

Unit: III BIOMEDICAL RECORDERS AND PATIENTS MONITORING SYSTEMS:

Block diagram and signal analysis of phonocardiography - Electroencephalograph. – Electromyograph – Measurement of heart rate – Measurement of blood pressure – Measurement of temperature – Measurement of respiration rate

Unit: IV THERAPEUTIC EQUIPMENTS:

Cardiac pacemaker - Cardiac defibrillators – Surgical diathermy – shortwave diathermy – Microwave diathermy- ultrasonic therapy unit – Pain relief therapy electrical stimulation.

Unit: V MODERN IMAGING SYSTEMS:

Computer X ray machine - X ray computer tomography – Basic NMR components – Echocardiography - Thermography equipment - MRI instrumentation - Positron emission tomography.

Text Book:

1. L.Cromwell.F., J,.Weibell and E.A.Pfeiffer."**Bio-Medical Instrumentation and Measurements**". PHI, 1991.

Reference Books:

1.R.Khandpur. "**Hand book of Bio-Medical Instrumentation**". TMH.II Edition., 2003.

2. M.Arumugam. "**Bio-Medical Instrumentation.”** Anuradha Agencies.1992.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF B.Sc. ELECTRONICS AND COMMUNICATION
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Title of the Paper	**: B.Sc. (E&C)**	**Part III**	**: Core (P)**
Semester	**: V &VI**	**Hours**	**: 03**
Sub code	**: 18UELCP3**	**Credits**	**: -**

COMMUNICATION LAB

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Remember the basic concepts of Filters

CO2: Understand the working principles of modulation and demodulation techniques

CO3: Construct analog and digital modulation and demodulation circuits

CO4: construct mini project based on communication system (FM Transmitter and Receiver)

CO5: understanding the concept of PLL synthesizer.

List of Experiments:

1. Low and High pass active filters.
2. Band pass and Band rejection active filters.
3. Cross over Network.
4. Sampling and reconstruction of signals.
5. Amplitude Modulation and Demodulation.
6. Suppressed Carrier amplitude Modulation.
7. Frequency Modulation and Demodulation.
8. Pulse Amplitude Modulation and Demodulation.
9. Pulse Width Modulation and Demodulation.
10. Pulse Position Modulation and Demodulation.
11. Pulse Code Modulation.
12. Voltage to Frequency Converter.
13. Experiments using Fiber Optic Kit.
14. Experiments 1 using MATLAB.
15. Experiments 2 using MATLAB.

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Title of the Paper	**: B.Sc. (E&C)**	**Part III**	**: Allied (P)**
Semester	**: V &VI**	**Hours**	**: 04**
Sub code	**: 18UELAP3**	**Credits**	**: -**

SENSORS AND TRANSDUCERS LAB

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Remember the basic concepts of Transducers

CO2: Understand the working principles of Temperature sensors

CO3: Understand the working principles of strain sensors

CO4: Understand the application of displacement and optical sensors.

CO5: Measure and calibrate all sensing devices.

1. Study of RTD, Thermistor characteristics.
2. Study of Thermocouples characteristics and cold junction compensation.
3. Study of IC Temperature sensors.
4. Study of Strain gauge and Load cell characteristics.
5. Study of LVDT and Tacho generator characteristics.
6. LDR and Opto-coupler characteristics.
7. Study of Piezo-electric transducers and vibration measurement using Piezo electric transducer.
8. PLL application circuits, Frequency multiplier.
9. Study of UJT, IGBT devices.
10. Speed control of AC/DC Motors using Thyristor.
11. Design and testing of FET input volt meter.
12. Phase sensitive detectors.

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Title of the Paper	**: B.Sc. (E&C)**	**Part III**	**: Core (P)**
Semester	**: V &VI**	**Hours**	**: 03**
Sub code	**: 18UELCP4**	**Credits**	**: -**

MICROPROCESSOR AND MICROCONTROLLER LAB

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Remember the instruction set of microprocessor and microcontroller

CO2: Understand the Assembly language programming

CO3: Write assembly language program for arithmetic, logical, data transfer operation

CO4: Design IO interfacing circuit with microprocessor and microcontroller

CO5: Design mini project based on the microprocessors and microcontroller

MICROPROCESSOR

1. Addition of two 8-bit numbers.
2. Subtraction of two 8-bit numbers.
3. Multiplication of two 8-bit numbers.
4. Division of two 8-bit numbers.
5. 1's and 2's complement of a given 8-bit data.
6. Largest/Smallest in an array.
7. Positive/Negative numbers in an array.
8. Odd/Even numbers in an array.
9. Number of 1's and 0's in a data.
10. Ascending/Descending order.
11. Block data transfer.
12. Reading/Writing of data using 8255 PPI.
13. Binary Counter/Ring Counter using 8255 PPI.

MICROCONTROLLER

1. Addition of two 8-bit numbers.
2. Subtraction of two 8-bit numbers.
3. Multiplication of two 8-bit numbers.
4. Division of two 8-bit numbers.
5. Addition of two 16-bit numbers.

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Semester	**: V &VI**	**Hours**	**: 02**
Sub code	**: 18UELPR1**	**Credits**	**: -**

PROJECT

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Define a project [K1]
CO2: Discuss a major issue in a project [K2]
CO3: Apply the interpretative skills on a theme [K3]
CO4: Compare the work of art in comparison with others [K5]
CO5: Create one's own project [K6]

Course Description

The Project is conducted by the following Course Pattern.

Internal

Presentation Submission	**40**

External

Project Report Viva Voce	**60**
Total	**- 100**

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Title of the Paper	**: B.Sc. (E&C)**	**Part III**	**: Core**
Semester	**: VI**	**Hours**	**: 05**
Sub code	**: 18UELC61**	**Credits**	**: 05**

MICROCONTROLLER 8051 AND EMBEDDED SYSTEMS

Course Outcomes:

On successful completion of this course, the students will be able:

CO1: Remember the basic architecture of 8051 microcontrollers and embedded processors.

CO2: Understand the concepts of addressing modes, instruction set, I/O ports, interrupt, timers.

CO3: Develop interfacing with various real-time system using embedded C programming

CO4: Focus on the architecture of PIC microcontroller.

CO5:Importance of the features, applications and functional description of ARM microcontroller.

UNIT-I 8051 Microcontrollers:

Architecture-Memory organization-Microcontrollers and embedded processors-

UNIT-II

Addressing modes-Instruction set-I/O ports-serial ports-interrupt-Timers

UNIT-III Interfacing with 8051 using embedded C programming

LCD –Keyboard-ADC-DAC-Sensor interfacing with signal conditioning- 8255-Stepper motor-DC motor-RTC

UNIT-IVPIC Microcontroller

16F87X Architecture –Core features-Peripheral features-pin diagram

UNIT-VARM Microcontroller

LPC 2378 –features-block diagram-applications-functional description

Text Books:

1. Mohammad Ali Mazidi,JaniceGillispieMazidi,RolinD.Mckinlay"The 8051 Microcontrollers and Embedded systems ",Dorling Kindersley (India)pvt.ltd,2nd edition,2006.
2. ARM NXP semiconductors datasheet.
3. PIC Microchip technology incorporated USA, 2001.

Reference Books:

1. Kenneth Ayala, **8051 Microcontroller,** ThomosDelmer Learning, United States, Third Edision, 1991.
2. Dr.RajivKapadia**, 8051 Micro Controller and Embedded systems,** Jaico Publishers, NewDelhi,2010

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Semester	**: VI**	**Hours**	**: 05**
Sub code	**: 18UELC62**	**Credits**	**: 05**

DIGITAL SIGNAL PROCESSING

Course Outcomes:
On successful completion of this course, the students will be able:
CO1: Understand Digital Signal Controllers and their Applications

CO2: Design digital filters IIR and FIR filters

CO3: Develop discrete form and cascade form of FIR and ITR system

CO4: Analyzethe concept of FFT and DFT

CO5: Evaluate finite word length effects in signal processing

Unit-1

Z-transform: Definition of Z transform – Inverse Z transform – Properties of Z transform.

Discrete Time System: Introduction – Block diagram representation of discrete time system. Classification of discrete time system – Static versus dynamic system – Time invariant versus time variant system – Linear versus Nonlinear system – Causal versus Non causal systems – Stable versus unstable systems.

Unit-2

Design of Digital Filter: Design of linear phase FIR filter using windows – IIR filler design: -impulse invariant method- bilinear transformation method – Review of design technique for analog low pass filter.

Unit-3

Realization of Digital Linear System:

Basic Structure for FIR system: Direct form – cascade form

Basic Structure for IIR system**:** Direct form -Cascade form structure- Parallel structure- Ladder structure.

Unit-4

Discrete Fourier transform: Definition and properties.

FFT algorithm: Introduction to radix 2 fast Fourier transforms – Decimation in time FFT - Decimation in frequency FFT.

Unit-5

Finite word length Effects in digital filters: Types ofNumber representation-Quantization noise- Truncation and rounding -quantization error -overflow limit cycle oscillation.

Text Books:

1. S.Salivahanan. A. Vallavaraj and C.GnanaPriya**, Digital Signal and Processing,**Tata McGraw-Hill publishing company**,** New Delhi, First Edition, 2001.
2. John G.proakisnandD.G.Manolakis**," Digital Signal and Processing"**PHI, 1986.
3. P. Rameshbabu**, "Digital Signal and Processing",** fourth edition Scitech 2007.

Reference Books:

1. P. Ramesh Babu, **Digital Signal Processing**,SciTech Publications, Chennai,Fourth Edition 2007.
2. Johny R Johnson**, Introduction to Digital Signal Processing**, Pearson Education, New Delhi, 2015.

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Semester	**: VI**	**Hours**	**: 04**
Sub code	**: 18UELE61**	**Credits**	**: 04**

INDUSTRIAL AUTOMATION

Course Outcomes:
On successful completion of this course, the students will be able:
CO1: Remembering the basics of industrial automation system
CO2: Understand the concepts of actuators
CO3: Develop data acquisition system
CO4: Focus on data acquisition systems
CO5: Importance of programmable logic controller
CO6: Develop the knowledge of PLC applications.

Unit: I

BASICS: Classification – Open loop systems – Closed loop systems – block diagrams of P, PI, PD,PID control systems-Advantages and Disadvantages.

Unit: II

ACTUATORS: Induction Motor-AC/DC Servomotor-DC motor – Stepper motor – Digital O/P Components(relays,lamps,meters,solenoid valve)

Unit: III

PROGRAMMABLE LOGIC CONTROLLER:

Block diagram – I/O module – Memory – Ladder diagram, Control system flowchart – Statement list –Timers- Counters- Applications.

Unit: IV

DATA ACQUISITION / SCADA: Analog input – Analog output – Digital I/O – Timing I/O – Basic Architecture of SCADA.

Unit: V

INDUSTRIAL FIELD BUSES: Process Field Bus(PROFIBUS) – Modbus – Device Net – Profinet – Industrial Internet

Text Books:

1. U.A.Bakshi, V.U.Bakshi. “CONTROL SYSTEMS”, Technical Publications Pune, II Revised Edition-2007.
2. N.Mathivanan. “PC-BASED INSTRUMENTATION CONCEPTS AND PRACTICE”, PHI Learning Private Limited, New Delhi 2009.

Reference Books:

1. KelvinCollins,PLC Programming for Industrial Automation, Exposure Publications, Florida, First Edition,2007.
2. Copy Prepared by Dept of E&C staff

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Semester	**: VI**	**Hours**	**: 04**
Sub code	**: 18UELE62**	**Credits**	**: 04**

ANTENNA AND WAVE PROPAGATION

Course Outcomes:
On successful completion of this course, the students will be able:

CO1: Define antenna parameters and radiation principles.

CO2: Understand the fundamentals of antenna types.

CO3: Manipulate the radiation resistance of dipole antennas.

CO4: Analyze the different types of frequency based antennas.

CO5: Importance of Wave propagation types.

UNIT – I

Radiation principle and Antenna Terminology: Principles of Radiation- Isotropic radiator –Antenna terminology –reciprocity theorem –Friis Formula.

UINT – II

Antenna Arrays: Pattern multiplication –Arrays of two driven antennas- Broadside array- end fire arrays –collinear arrays –Parasitic array –Linear array with ‘n’ isotropic point source –Stacked array- Traveling wave radiators.

UNIT – III

Antenna Fundamentals: Radiation from an oscillation dipole – Short linear antennas – Half wave dipole as a basic radiating element – Folded unipole and dipole antennas – Shunt fed dipoles – slot antennas – Loop antennas – Standing wave radiators.

UNIT – IV

Antenna Practice : Antenna for low Frequencies –Beverage antenna for medium frequencies – Tower antenna –Effects off ground on antenna performance –Ground systems –Top Loading –Excitation Methods –Antenna Couplers,baluns –Resonant V-Inverted V antenna –Rhombic arrays for MUSA-Diversity reception.
Yagi-Uda antenna –Cornerreflector –bi conical antenna –Turnstile Antenna –Helical antenna –Parabolic reflector-Horn antenna –Lens antenna –Log Periodic antenna

UNIT – V

Wave Propagation : Propagation in Free Space –Propagation Around the earth Surface wave and its propagation –Structure of the Ionosphere –Propagation of plane waves in an ionized medium-Determination of critical frequencies- Maximum Usable Frequency – Effect of Earth's magnetic field –Ionosphere variation –Fading –Refractive index of troposphere- Effect of Surface irregularities –Scatter propagation..

Text Books:

1. Prasad K.D., "Antenna and Wave Propagation", Satya Prakasan 3rd edition , 1996.
2. Edward C. Jordan and Keith G. Balamani, "Electromagnetic C waves radiating systems", Prentice Hall II Ed, 1995.

Reference Books:

1. Kraus, "Antennas", II Ed, TMH, 1997.
2. Rajeswari Chatterjee, "Antenna Theory Practice", Wiley Eastern.
3. F.E. Terman. "Electronics and Radio Engineering" McGraw Hill, 1984.

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Semester	**: VI**	**Hours**	**: 04**
Sub code	**: 18UELE63**	**Credits**	**: 04**

MICROWAVE AND RADAR SYSTEMS

Course Outcomes:

On successful completion of this course, the students will be able:

CO 1: Understand the theory of microwave and Radar systems
CO 2: Discuss the working of microwave amplifiers, oscillators and devices.
CO 3: Design and analyze the microwave amplifiers, oscillators and devices.
CO 4: Illustrate the different types of radar systems
CO 5: Evaluate the concepts of Radar transmitter and receiver.
CO 6: Generalize the concepts of Microwave and radar systems.

Unit: I

MICROWAVE TUBES: High Frequency limitation of conventional tubes – Principle of velocity modulation – Klystron amplifiers – Reflex Klystrons – Magnetron oscillators – Travelling wave tubes – Backward oscillators.

Unit: II

MICROWAVE SOLID STATE DEVICES: High Frequency limitations – Microwave transistors – Varactor diode – Parametric amplifier – Tunnel diodes – Theory of negative resistance amplifiers – Gunneffect – Gunn diode oscillators – Avalanche effect IMPATT and TRAPATT diodes – Lasers and Masers.

Unit: III

MICROWAVE COMMUNICATION SYSTEMS: Simplified microwave system block diagram – Repeaters – Need for diversity – Frequency and space diversity – Protection switching arrangements – Microwave radio communication- system gain.

Unit: IV

RADAR SYSTEMS: Radar range equations – Mono static and bi static radars – CW (Continuous wave) Radar – Frequency modulated CW radar – –Altimeters – MTI and pulse Doppler radar – Tracking radars – Conical scan, Sequential – Lobbing Monopolies.

Unit: V

TRANSMISSION AND RECEIVER: Modulators – Line type modulator, hard tube modulator, Saturable reactor modulator – Signal detection in noise – Duplexers - Displays- Radar antennas.

Text Book:

1. Reich J.H.,"MICROWAVE PRINCIPLES", Van nostrand Reinhold co., 1st edition, 1987.

Reference Books:

1. Tomasi W. "ADVANCED ELECTRONIC COMMUNICATION SYSTEMS", Prentice Hall International, 1987.
2. Liao Y.S., "MICROWAVE DEVICE AND CIRCUITS", Prentice Hall of India, 3rd Edition, 5th reprint 1992.
3. Solink M.I., "INTRODUCTION TO RADAR SYSTEMS", McGraw Hill, 2nd Edition, 1992.

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Title of the Paper	**: B.Sc. (E&C)**	**Part IV**	**: Skilled**
Semester	**: VI**	**Hours**	**: 02**
Sub code	**: 18UELS61**	**Credits**	**: 02**

COMPUTER NETWORKS

Course Outcomes:

On successful completion of this course, the students will be able:

CO 1: Understand the basics of computer networks and reference models
CO 2: Explain the communication medium of physical layer
CO 3: Develop the knowledge of data link layer and medium access layer
CO 4: Compare all layers in OSI model and TCP/IP
CO 5: Importance of Network usage in recent trend

UNIT I:

Introduction: User of computer networks – Network Hardware – Network Software – Reference Models – Example Networks – Example data communication services – Network Example data communication services – Network Standardization.

UNIT II:

Physical Layer: Transmission media – Wireless Transmission – The Telephone system – Cellular radio – Communication satellites.

UNIT III:

Data Link Layer & Medium Access Layer: Data Link Layer Design Issues – Elementary Data Link Protocols – Multiple Access Protocols – Ethernet, Token bus, Token ring.

UNIT IV:

Network Layer & Transport Layer: Network Layer Design Issues – Routing Algorithms – The Transport Service – Elements of Transport Protocols.

UNIT V:

Application Layer: Network Security – Electronic mail – Usenet news – The World Wide Web- Multimedia.

Text Book:

1. Tanenbaum, Computer Network, Prentice Hall India,New Delhi, II Edition,1989.

Reference Books:

1. Keiser,G.E., Computer Area Network, Tata MC Graw Hill Publishing company, New Delhi.
2. Andrew S.Tanenbaum, Computer Networks, Pearson Education,New Delhi,207.

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Title of the Paper	**: B.Sc. (E&C)**	**Part IV**	**: Skilled**
Semester	**: VI**	**Hours**	**: 02**
Sub code	**: 18UELS62**	**Credits**	**: 02**

TELEVISION SYSTEMS

Course Outcomes:

On successful completion of this course, the students will be able:

CO 1: Define the various parameters of television picture

CO 2: Understand the working principle of camera tubes

CO 3: Develop knowledge in transmitting and receiving concepts of TV

CO 4: Compare monochrome television and color television system

CO 5: Importance of advanced television systems

Unit- I

Television picture and TV standards: Geometric forms and aspect ratio of the picture - Scanning - Interlaced scanning - Number of scanning line - VSB transmitter - Complete channel bandwidth - Reception of VSB - TV standards.

Unit - II

Camera tubes: Block diagram of camera tubes - Photo conductive - Photo emission principle - Block diagram of Transmitter - Visual exciter - Aural exciter - Diplexers.

Unit –III

Transmitter and Receiver

Video Detector- Dc Restoration- Sync Separator-Vertical and Horizontal system-Vertical output stage- EHT Generation

Unit –IV Television Receiver:

Block diagram of TV Receiver - RF tuner - IF stage - Wave trap circuits

Unit-V

Trends in TV: LED TV–LCD TV- Compatibility with monochrome and vice versa color TV transmission and reception - Advanced TV's.

Text Book:

1. Gulati R.R. Monochrome and Colour TV, Wiley Eastern Limited, New Delhi,II Edition,1991.

Reference Books:

1. Grob, Hernbdon,Basic Television and Video Systems,Tata McGraw Hill Publishing Company,NewDelhi,VI edition,1999.

2. K.G.Jackson and G.B.Townsend,TV and Video Engineers reference book,Butterworthheineam,Oxford, First Edition,1991.

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Semester	**: V &VI**	**Hours**	**: 03**
Sub code	**: 18UELCP3**	**Credits**	**: 04**

COMMUNICATION LAB

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Remember the basic concepts of Filters

CO2: Understand the working principles of modulation and demodulation techniques

CO3: Construct analog and digital modulation and demodulation circuits

CO4: construct mini project based on communication system (FM Transmitter and Receiver)

CO5: understanding the concept of PLL synthesizer.

List of Experiments:

16. Low and High pass active filters.
17. Band pass and Band rejection active filters.
18. Cross over Network.
19. Sampling and reconstruction of signals.
20. Amplitude Modulation and Demodulation.
21. Suppressed Carrier amplitude Modulation.
22. Frequency Modulation and Demodulation.
23. Pulse Amplitude Modulation and Demodulation.
24. Pulse Width Modulation and Demodulation.
25. Pulse Position Modulation and Demodulation.
26. Pulse Code Modulation.
27. Voltage to Frequency Converter.
28. Experiments using Fiber Optic Kit.
29. Experiments 1 using MATLAB.
30. Experiments 2 using MATLAB.

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Sub code	**: 18UELAP3**	**Credits**	**: 03**

SENSORS AND TRANSDUCERS LAB

Course outcomes:

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CO1: Remember the basic concepts of Transducers

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CO4: Understand the application of displacement and optical sensors.

CO5: Measure and calibrate all sensing devices.

13. Study of RTD, Thermistor characteristics.
14. Study of Thermocouples characteristics and cold junction compensation.
15. Study of IC Temperature sensors.
16. Study of Strain gauge and Load cell characteristics.
17. Study of LVDT and Tacho generator characteristics.
18. LDR and Opto-coupler characteristics.
19. Study of Piezo-electric transducers and vibration measurement using Piezo electric transducer.
20. PLL application circuits, Frequency multiplier.
21. Study of UJT, IGBT devices.
22. Speed control of AC/DC Motors using Thyristor.
23. Design and testing of FET input volt meter.
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Sub code	**: 18UELCP4**	**Credits**	**: 03**

MICROPROCESSOR AND MICROCONTROLLER LAB

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Remember the instruction set of microprocessor and microcontroller

CO2: Understand the Assembly language programming

CO3: Write assembly language program for arithmetic, logical, data transfer operation

CO4: Design IO interfacing circuit with microprocessor and microcontroller

CO5: Design mini project based on the microprocessors and microcontroller

MICROPROCESSOR

14. Addition of two 8-bit numbers.
15. Subtraction of two 8-bit numbers.
16. Multiplication of two 8-bit numbers.
17. Division of two 8-bit numbers.
18. 1's and 2's complement of a given 8-bit data.
19. Largest/Smallest in an array.
20. Positive/Negative numbers in an array.
21. Odd/Even numbers in an array.
22. Number of 1's and 0's in a data.
23. Ascending/Descending order.
24. Block data transfer.
25. Reading/Writing of data using 8255 PPI.
26. Binary Counter/Ring Counter using 8255 PPI.

MICROCONTROLLER

6. Addition of two 8-bit numbers.
7. Subtraction of two 8-bit numbers.
8. Multiplication of two 8-bit numbers.
9. Division of two 8-bit numbers.
10. Addition of two 16-bit numbers.

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Title of the Paper	**: B.Sc. (E&C)**	**Part III**	**: Core (P)**
Semester	**: V &VI**	**Hours**	**: 02**
Sub code	**: 18UELPR1**	**Credits**	**: 04**

PROJECT

Course outcomes:

On successful completion of the course, the leaners should be able to:

CO1: Define a project [K1]
CO2: Discuss a major issue in a project [K2]
CO3: Apply the interpretative skills on a theme [K3]
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