

Punyashlok Ahilyadevi Holkar Solapur University, Solapur Syllabus For B.Sc. III Electronics (CBCS Pattern)

Choice Based Credit System (CBCS) Pattern To be implemented from Academic Year 2021-22

1. Preamble:

of (B.Sc.) Electronics **Bachelor** Science in is the course disseminatingknowledge of the subject from fundamental concepts to state-oftechnologies.Indeed, the curriculum encompasses knowledge of various themes such Embedded as Microcontroller and System, Instrumentation, CommunicationElectronics. Power Electronics. Medical Electronics. Virtual Instrumentation, etc. The Choice Based Credit System (CBCS) is implemented for this course. Out of4 theory papers, in each semester, 3 papers are of core. However, students haveto opt one paper from DSE papers. In the practical course of 400 marks there are compulsory experiments for practical course IV, V, VI and VII. Moreover, project work is also mandatory in curriculum at last semester to ensure better practical knowledge and hence better jobopportunities in industrial sector. The details are mentioned in the syllabus.

2. Objectives of the course:

The aim of the course is to generate trained manpower with adequate theoretical and practical knowledge of the various facets of electronic circuits and systems. Due care is taken to inculcate conceptual understanding in basic phenomena, materials, devices, circuits and products and development of appropriate practical skills suitable for industrial needs. Objectives are

- To design the syllabus with specific focus on key Learning Areas.
- To equip student with necessary fundamental concepts and knowledge base.
- To develop specific practical skills.
- To impart training on circuit design, analysis, building and testing.
- To prepare students for demonstrating the acquired knowledge.
- To encourage student to develop skills for accepting challenges of upcoming technological advancements.

3. Course Structure:

Subject/	~		Marking Scheme		Hrs/Week			Credit	
Core	Subject	Title of the paper	UA	CA	Total	L	Т	Р	s
Course		Semester _V					-	-	
$\mathbf{D} = \mathbf{D} = $									
(AECC)	ECC) Addity Paper II Part A Enhance English		40	10	50	4	-	-	2.0
	ment	(Business English)							
	Course								
IX	Core 1	Linear Integrated Circuits and Applications	80	20	100	4	-	-	4
Х	Core 2	Fundamentals of Microcontroller	80	20	100	4	-	-	4
XI	Core 3	Sensors and Transducers	80	20	100	4	-	-	4
	DSE-1	Biomedical Electronics							
XII	DSE-2	Electronics Communication	80	20	100	4	-	-	4
SEC Add-on-self learning (On- Platform: MOOC/SWAYA		Add-on-self learning (On-line Platform: MOOC/SWAYAM	80	20	100	4			4
		Course/Skill Course)	80	20	100	4			4
		Total	440	110	550	24	-	-	22
		Semester –VI	110	110	550	24		I	
(AECC)	Ability	Paper II Part B	40	10	50	4	-	-	2.0
	Enhance	English							
	ment	nent (Business English)							
	Course								
XIII	Core 1	Power Electronics		20	100	4	-	-	4
XIV	Core 2	Embedded System Design		20	100	4	-	-	4
XV	Core 3	Electronics Instrumentation	80	20	100	4	-	-	4
XVI	DSE-1	Virtual Instrumentation		20	100				4
	DSE-2	Modern Communication Systems	80	20	100	4	-	-	4
	SEC	Add-on-self learning (On-line	80	20	100	4			4
		Course/Skill Course)	80	20	100	4			4
		Total	440	110	550	24	-	-	22
		Practical		110	000				
	Core 1	Practical V	80	20	100	-	-	5	4
Core 2 Practical VI		80	20	100	-	-	5	4	
Core 3 Practical VII		80	20	100	-	-	5	4	
	DSE-1/2 Practical VIII		80	20	100	-	-	5	4
	Project/ Internship								
	320	80	400	-	-	20	16		
Grand Total 1200 300 1500 48 - 20 60									

Abbreviations: L: Lectures T: Tutorials **P:** Practical UA: University Assessment

CA: College Assessment DSE: Discipline Specific Elective Paper SEC: Skill Enhancement Course

4. Nature of theory question paper

The nature of theory question paper is as per university common model. Total Marks 40. 12

Q. 1 Multiple choice questions (One mark each)

Q. 2 Short answer question (Any four)		04
Q. 3 A Short answer question (Any two)		05
B Short answer question (one compulsory)	03	
Q. 4 Short answer question (Any two)		08
Q. 5 Long answer question.		08
OR		
Q. 5 Answer the following.		08
A.		
В.		

5. Distribution of Practical Marks (400) :

Sr. No.	UA (320)		CA (80)			
1.	Practicals	200	Circuit Test ($10 + 10$)	20		
	(50 x 4Practicals)					
2.	Project(Project-60,Report-	100	Practical Test ($20 + 20$)	40		
	10,Oral-10, Presentation-10,					
	Idea/Theme-10)					
3.	Journal	20	Student Seminar	10		
4.			Industrial visit/ IndustrialCase	10		
			Study /Visit to industrial			
			exhibition/Participation in			
			Conference/ Workshop/ Seminars			
	Total	320	Total	80		
			Total	400		

A) University Assessment:

Practical Marks (50X4=200) may be as given below.

- a) Circuit diagram/ Flow Charts -10
- b) Assembly of the circuit/Programming -10
- c) Understanding/Observations -10
- d) Calculations, graph / printout -10
- e) Result / comment -05

f) Oral -05

- Flexibility should be given to the students to write code of respective experiments.
- **Project:** Every student should take up a project and submit the report of the work carried out. The project work will be assessed independently at the ime of practical examination.
- It is mandatory for the students to produce certified journal at the time of practical examination.

B) College Assessment (80):

- **Circuit Diagram Test** : Two circuit diagram tests, each of 10 marks.
- **Practical Test :**Two practical tests, semester-wise, each of 20 marks.
- **Seminar:** Every student of B.Sc. III, Electronics will have to deliver one seminar of at least 10minutes on any advanced topic in Electronics using ICT(power point presentation) and submit the report of presentation, for 10marks.

• Industrial visit / Local industry case study / Job training/ Visit to industrialexhibition/Participation in the Conference/ Workshop/seminars :In order to give the exposure of industry/ Research Institute and advances in the field of Electronics, industrial visit should bearranged and submit the report.OR he should submit the report of the case study of local industryor on jobtraining (minimum four days) OR he may visit to an industrial/ Scienceexhibition ORparticipate in conference / Seminar / workshop and produce certificate of participation, for 10marks.

C) Skill Enhancement Course (SEC):

Student has to complete min one of this activity on his own resources and has to
produce the certificate of the same. If any official documentation is necessary from
institute, it will be provide, e.g. consent letter, etc. The Internship/Industrial Training
must have min of 240 hours.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester -V PaperIX: Linear Integrated Circuits and Applications

Total Marks: 100

Unit 1. Fabrication of Integrated Circuits 15 Advantages of IC's, Epitaxial process, Diffusion process: Constant source and Limited source, Oxidation (SiO2 layer), Photolithography, Metallization,Fabrication of monolithic components:NPN and PNP, transistors, diodes, resistors and capacitors.

Unit 2.Non linear Application of Op- amp

Precision full wave rectifier, Active peak detector, Sample and hold circuit, Clipper and Clamper, Log and Antilog Amplifier.

Unit 3.Active Filters

Introduction to filters (Passive and Active), Advantage of active filters overpassive filters, Classification (low pass, high pass, band pass, band stop and allpass filters), Types of filters (Butterworth and Chebyshev) and their comparison, Second order Butterworth Lowpass and High pass filters, Band pass, Band stopfilters (narrow and wide).

Unit 4. Regulated Power Supply

Series Op-Amp regulator, Basic block diagram of IC regulator, Protectioncircuits for IC regulators (over current, over voltage, thermal shutdown) Voltageregulators using IC78XX, 79XX, LM 317 and LM337.Designing of regulatedpower supply for 5Volt.

Unit 5. Phase Locked Loop

VCO, Block diagram of PLL, Principle and working of PLL, Transfercharacteristics, Derivation of lock range and capture range, Features of IC 565, Application of PLL as Frequency multiplier, FM demodulator, FSK demodulatorusing IC 565. V to F converter and F to V converter (LM 331)

Reference Books:

- 1. Integrated Circuit (New Edition) K. R. Botkar
- 2. Integrated Electronics Millman and Halkies (MGH)
- 3. Linear Integrated Circuit D Roy Choudhari, Shail Jain (Wiley Eastern Ltd)
- 4. Op-Amps and Linear Integrated Circuits RamakantGaikwad (PHI)

(60 Periods)

Credits: 04

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester -V Paper X : Fundamentals of Microcontroller

Total Marks: 100

Unit 1. Architecture of Microcontroller

Comparison of Microprocessor and Microcontroller, Requirement of Microcontrollers, Overview and features of MCS 51 Family, Block Diagram and Pin description of 8051, Memory organization, GPRS, and SFRs, Flags, I/OPorts, study of Timer/Counter, study of Interrupts, study of Serial communication port, Clock and Reset circuit.

Unit 2. Instruction Set of 8051

Addressing Modes, Instruction Set, Execution of Instruction, Classification of Instruction Set - Data transfer group, Arithmetic group, Logical group, branchcontrol group, Boolean/Single Bit Instructions, Concept of Stack and Subroutine.

Unit 3. Assembly Language Programming with 8051

Assembly Language Programming for Data Transfer, Arithmetic and Logicaloperations.Branching and Looping,I/O Port Programming and Bit manipulation,Time Delay Subroutine.

Unit 4. Timer and Interrupt Programming in 8051

Configuration of timers as a timers in various modes, Configuration of Timer asa Counter, Time delay generation, square wave generation. Programming of theinterrupts: ALP for interrupt (external and internal) execution.

Unit 5. Serial Port Programming in 8051

Basics of serial communication, Serial port of 8051, RS-232 standard and ICMAX–232, Baud rate in 8051, Baud rate doubling using crystal frequency andPCON register, SBUF, SCON registers, Importance of TI and RI flags, Assembly Language Programming for serial data transmission and reception.

Reference Books:

- 1. The 8051 microcontroller Architecture, programming and application byKenneth J. Ayala
- 2. The 8051 Microcontroller and Embedded Systems, M. A. Mazadi, J. G. Mazadi, Pearson Education, Asia
- 3. Microcontroller by Ajay Deshmukh
- 4. Microcontroller by D. S. Dhote

Credits: 04(60 Periods)

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester –V Paper XI :Sensors and Transducers

Total Marks: 100

Credits: 04(60 Periods)

Unit 1. Fundamentals of Sensors and Transducers

The measurand, basic needs of measurements, Block diagram of measurementsystem, Characteristics of measurement Systems, static characteristics, dynamiccharacteristics and responses, Need of system calibration.Definition: Sensor and Transducer, Principle of transduction, Basic differencebetween sensor and transducer, Types of sensor, Static and Dynamiccharacteristics,Classification of transducers, Basic requirement of transducers,Selection criteria for transducer.Concept of Active and Passive Sensors.

Unit 2. Resistive Transducers

Principle of operation, Potentiometer, Resistance pressure transducer, Resistiveposition transducer, Strain gauge, Temperature transducer: RTD, Thermistors.

Unit 3. Inductive Transducer

Principle of operation, Variable reluctance type transducer, Differential transducer:Linear Variable Differential Transducer (LVDT) and Rotary Variable DifferentialTransducer (RVDT)

Unit 4. Capacitive Transducer

Principle of operation, Variable Area Type, Variable Air Gap type, VariablePermittivity type, Capacitor microphone.

Unit 5. Electronic Transducers and Actuators

Transducers: Thermocouple, Piezoelectric transducer, Hall Effect transducers, Photoelectric transducer: LDR, Photo-voltaic cell, Photo diode, Phototransistor.Pyrometers. Smart Sensors: Temperature sensor (LM35), LPG sensor(N26), PIR sensor. Actuators : Electromagnetic Relay, Solenoid, Opto-couplers.

Reference Books:

- 1. A Course in Electrical and Electronics Measurements and Instrumentation by AKSawhney, DhanpatRai Publication.
- 2. Electronic Instrumentation by K.S.Kalsi, TMH Publication.
- 3. Sensors and Transducers by KV Gitapathi, Center: Technical Coordination.
- 4. Instrumentation devices and systems, CS Rangan, JR Sharma and VSV Mani, MGH.
- 5. Smart sensors from datasheet (LM35, N26, PIR)
- 6. Basic Electronics B L Thereja S Chand.

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B.Sc.-III** (Electronics) CBCS PatternSemester –V PaperXII(DSE-1): Biomedical Electronics

Total Marks: 100

Unit 1. Bioelectric Signals

12 Introduction to physiological systems, Sources of biomedical signals. The origin ofBioelectric signal: Resting and Action potentials, Propagation of action potentials.Introduction to bioelectric signals: ECG, EEG, EMG.

Unit 2. Study of Bioelectric Electrodes

Introduction to electrode theory, Silver-Silver Chloride electrode, Classification Microelectrodes: Metal ofbioelectric electrodes, and micropipette.Surface electrodes:Limb & Floating electrode, ECG Leads,Suction-cup electrode, fluid columnelectrode, Pad electrode. Needle electrode

Unit 3. Fundamentals of Biomedical Instrumentation System 12

instrumentation Basic architecture of medical preamplifiers, system, differentialamplifiers, instrumentation amplifiers, Isolation amplifier, Sources of the noise.

Unit 4. Monitoring System

Electrocardiograph (ECG): Basic principle, block diagram of ECG. Electroencephalograph (EEG): Basic principle, block diagram of EEG. Electromyograph (EMG): Basic principle, block diagram of EMG

Unit 5. Imaging System

Basic of Diagnostics radiology, Block diagram of x- ray machine, Principles ofUltrasound: properties, mode of transmission and imaging.

Reference Books:

- 1. Handbook of Biomedical Instrumentation, -R.S. Khandpur, 2nd edition, TMH, NewDelhi Reprint 2007
- 2. Introduction to Biomedical Equipment Technology- J.J.Carr& J.M. Brown, PHI1993.
- 3. Biomedical Instrumentation and Measurements -Cromwell, Weibell& Pfeiffer, PHI2nd Ed.

Credits: 04(60 Periods)

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester –V Paper XII(DSE-2): Electronics Communication

Total Marks: 100

Unit 1. Introduction to Communication System

10 Introduction, Need. importance. of communication Elements electronic system, Typesof communication system, analog communication system. digital communication system, concept of simplex and duplex communication, Noiseincommunication (S/N ratio and noise figure).

Unit 2. Modulation and Demodulation Techniques

Need, Types of modulation-Analog and digital modulation.

Analog Modulation: Amplitude modulation: Principle, mathematicalexpression, modulation index, Power distribution, frequency spectrum, Conceptof DSB, SSB, VSB.

Frequency modulation: Principle, mathematicalexpression, modulation index, frequency spectrum, side bands.

Demodulation of AM and FM (Envelop detector & ratio detector)

Digital Modulation: Introduction to PAM, PWM, PPM, PCM, ASK, FSK, FDM & TDM

Unit 3. Antenna and Radio Wave Propagation

Principle of antenna, Concept of radiation pattern, Antennaparameters, Evaluation of $(\lambda/2)$ antenna (without mathematical treatment), Typesof antenna: Yagi and Parabolic antennas (radiation pattern, frequency range, applications). Radio Wave propagation: Principle, types of radio wave propagation: Ground waves, Space waves, Sky waves, Concept of skip distance of Virtual height.

Unit 4. Radio Receiver and Television

Radio receiver: Characteristics of receiver, Superheterodyne principle, Blockdiagram of AM, FM receivers, Television: Concept and block diagram of Blackand White television transmission and reception, TV interlace scanning, Television standards, Band requirement, VSB, Composite video signal, Introduction to colour TV

Unit 5. Telephone System

Principle, telephone handset, subscriber local loop, Need of telephone exchange, Electronic telephone exchange, Different tones in telephone, DTMF dialer.

Reference books:

- 1. Principle of Communication Engineering by Anokh Singh, S.chand and company.
- 2. Communication electronics: Principles and applications by Frenzl, 3rdedition, TMH.
- 3. Radio engineering(Applied electronics Vol.-II): by G.K.Mitthal, khanna publication.
- 4. Electronic Communications (4th Edition) Dennis Roddy, John Coolen

Credits: 04(60 Periods)

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester –VI Paper XIII: Power Electronics

Total Marks: 100

Unit 1. Power Devices

Power diode: Construction, switching characteristics and applicationsEffect of reverse and forward recovery time.

Power BJT and MOSFET: Construction, switching characteristics and applications), IGBT and SIT: Construction, working, applications, Thermal considerations and heat sinks for power devices

Unit 2. Thyristor

SCR: operating principle with two transistor analogy, V-I characteristics,Latching Current (IL) and Holding Current (IH), advantages, disadvantages, andapplications. GTO and PUT: Construction, working, V-I characteristics, and applications. Concept of turn on mechanism of SCR: Forward break-over triggering (HighVoltage triggering), dv/dt triggering, thermal triggering, illumination triggering,gate triggering. Triggering circuits: R, RC, UJT and PUT (operation withwaveforms), Concept of turn off mechanism of SCR, Turn OFF methods: Class A, Class B,Class C and Class D, (Working with waveforms), Concept of di/dt, dv/dt and itsprotection circuits.

Unit 3. Controlled Rectifier

Concept of Phase control (Firing and conduction angle), Single phase half wave controlled rectifier with resistive and inductive load, Effect of free-wheeling diode, Single phase full wave controlled rectifier with resistive load and inductive load, Three phase full wave controlled rectifier with resistive load (without mathematical treatment).

Unit 4. Invertors and Choppers

Classification of inverters, Transistor inverter, Series and Parallel Inverter usingSCR, Basic principle of single phase half and full bridge inverter, Concept ofChopper Basic chopper circuit, Step down and step up chopper using SCR,Jones chopper

Unit 5. Applications of Power devices

Applications of Thyristors: Speed control of dc Motor, flasher circuit, battery chargercircuit, emergency lighting system, block diagram and concept of UPS, blockdiagram and concept of SMPS.

Reference Books

- 1. Power Electronics- M. H. Rashid (PHI)
- 2. Power Electronics- Dr. P. S. Bimbra, (Khanna Publication)
- 3. Power Electronics- P. C. Sen (TMH)
- 4. Thyristor Engineering- M. S. Berde (Khanna Publication)

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04(60 Periods)

Credits:

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester -VI Paper XIV: Embedded System Design

Total Marks: 100

Unit 1. Fundamentals of Embedded Systems design 09 Definition of an embedded system, Basic architecture of embedded system, characteristics of embedded systems, Applications of embedded systems.Minimum

Unit 2. Programming with the C

Introduction to C programming: Basic Structure of C program, character set,keywords and identifiers, constants and variables, concept of global declarationand local declaration, data types and data ranges, expressions and operators.Study of IO statements, Control Statements, Arrays, Loops, User's definedfunctions. Simple examples.

Unit 3. Fundamentals of Embedded C

Basic Structure of Embedded C program, Need of Operating System, Concept of Super loop. An embedded C programs for

- 1. Generation of Time delay with and without use of timers.
- 2. Square wave generation,
- 3. Programming of I/O port and Serial Port

89s51 based hardware for general embedded system.

4. Interrupts.

Unit 4. Interfacing of devices: The Hardware and Software

Development of both Hardware and software for interfacing of Switches, Thumbwheel switch, Relays, LEDs, Transistor, Opto-coupler, Seven SegmentDisplay, 16 X 2 LCD, Stepper Motor, ADC 0804/0809 and DAC 0808, DAC byusing PWM technique.

Unit 5. Designing of an Embedded System

- 1. Designing of microcontroller 89s51 based embedded system forMeasurement of Temperature of an environment
- 2. Designing of microcontroller 89s51 based embedded system forMeasurement of humidity of an environment.
- 3. Designing of microcontroller 89s51 based embedded system for DC motorcontrol using PWM technique.

(Flowchart of the necessary embedded software is expected only)

Reference Books

- 1. Embedded C Michael J Point
- The 8051 Microcontroller and Embedded Systems Using Assembly and CMohammadAli Mazidi, Janice GillispieMazidi, Rolin D. McKinlay 2ndEdition, Pearson Education (Prentice Hall)
- 3. Microcontroller By Ajay Deshmukh

Credits: 04(60 Periods)

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester -VI Paper XV: Electronics Instrumentation

Total Marks: 100

Credits: 04(60 Periods)

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Unit 1. Fundamental of Signal Conditioning

General block diagram for electronics instrument design for measurement.Minimum requirements, Block diagram of dc and ac signal conditioning techniques, Excitation, Grounding and electromagnetic and electrostatic shielding. Signal conditioners, Pre-amplifiers- Bridge amplifier, Instrumentation amplifier, Isolation amplifiers and chopper Amplifiers, Display unit.

Unit 2. Programmable instrumentation amplifiers

Need of Programmable instrumentation amplifier, Salient features of ProgrammableInstrumentation amplifiers. Salient features, Block diagram and Pin description ofInstrumentation amplifiers AD620, Salient features, Block diagram and Pindescription of Precision amplifiers AD594/595.

Unit 3. Signal transformation and Data Acquisition System (DAS) 13

Offset compensation, 4-20mA current transmission, Ratio metric and logarithmic conversion. Need of DAS, Single channel DAS, Multi-channel DAS, Data loggers: Basic Operation of data loggers, compact data loggers. Computer based DAS.

Unit 4. Measuring Instruments and Display and Recording Devices 13

Digital multimeter (DMM), Signal and Function generator, Analog CRO, DigitalStorage Oscilloscope, LCR Q Meter(Principle, Block diagram and working) X-T Recorder, X-Y Recorder, Magnetic recorder, Digital data recorder.

Unit 5. Case Study

Study of (Principle, Block diagram and working) PH Meter, Conductivity meter and Temperature meter.

Reference Books

- 1. Electronic Instrumentation by K.S.Kalsi, TMH Publication.
- 2. Electronic Measurements by U.A.Bakshi and V.U.Bakshi, Technical Publication.
- 3. Instrumentation Measurement and Analysis by NakaraChoudhary(TMH)
- 4. Transducers Interfacing Handbook by DH Sheingold, Analog Devices Inc.
- 5. A Course in Electrical and Electronics Measurements and Instrumentation by AKSawhney, DhanpatRai Publication.

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester -VI Paper XVI (DSE-1): Virtual Instrumentation

Total Marks: 100

Unit 1. Fundamentals of Virtual Instrumentation

Historical perspectives, Basic concept of Virtual Instrumentation, Importance of VI, Block diagram and architecture of Virtual Instrumentation, data- flowtechniques, graphical programming in data flow, Comparison between Virtualinstrumentation and Traditional Instrumentation, Advantages of VirtualInstrumentation.

Unit 2. Standard tools for Virtual instrumentation

Need of IDE for development of Virtual Instrumentation system, basic features of the tools, LABView, Proteus, Circuit Maker, PSPICE. Comparative approach.

Unit 3. Fundamentals of LABVIEW

Introduction to LABVIEW the virtual Instrumentation software, VirtualInstrumentation programming techniques, "G" Programming Language.Labview windows, front panel window, Block diagram window, Creating andsaving VI, Terminals, Nodes, Functions, wires etc.

Unit 4. Development of Virtual Instrumentation with LABView

The VI and sub-VI loops, charts, arrays, clusters and graphs, case and sequencestructures, formula nodes, local and global variables, string and file IO. Suitableexamples.

Unit 5. Case studies

Designing of Virtual Instrumentation using LABVIEW for

- 1. Data Acquisition Systems for Measurement of physical parameters
- 2. Temperature controlling

Reference Books

- 1. Virtual Instrumentation by using LabVIEW- Jovitha Jerome, PHI, New Delhi, 2011.
- 2. Graphical programming Gary Johnson, 2nd Edition, MGH, 1997.
- 3. LABVIEW for everyone –Lisa K wells and Jeffery Travis PHI 1997.
- 4. Basic concept of LABVIEW 4-Skoff-PHI 1998.

(60 Periods)

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Credits: 04

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester -VI Paper XVI(DSE-2): Modern Communication Systems

Total Marks: 100

Unit 1. Fiber Optic Communication

Need of light wave communication, working principle of fiber optic cable,Definition and terminologies: bit rate, baud rate, bandwidth, channel capacity,power budget calculation Block diagram of Optical Fiber Communication System,Fiber optic cables, types, Splicer and Connectors. Sources and Detectors;Transmitter and receivers,Applications

Unit 2. Satellite Communication

Satellite Orbits, Satellite Communication System, Earth Station, and Transponders, Application of Satellite communication system (TV distribution, surveillance and satellite phones)

Unit 3. Mobile Communication

Concept of cell, basic cellular system and its operational procedure, Hand off, power requirements, Block diagram Transmitter, receiver, Frequencysynthesizer, logic unit, control unit.

Unit 4. Microwave and Radar Communication

Basics of microwave communication, advantages, Transmission lines, Waveguides and cavity resonators, Microwave semiconductor devices (Gunndiode), microwave tubes (Klystron). RADAR: Concept of radar, Pulsed RadarSystem.

Unit 5. Computer Communication

Digital Data Communications Concepts, Modems: Block diagrams of QPSK and QAM Protocols., Computer Networks: LAN, MAN, WAN. Network Topologies (Star, Ring, and Bus) Concept of Internet, Bluetooth and Wi-Fi and their standards.

Reference Books

- 1. Communication Electronics Frenzel (TMGH)
- 2. Analog and Digital Communication Systems Martin S. Roden
- 3. Digital and Data Communications Martin (PHI)
- 4. Hand Book of Electronic Communications Miller
- 5. Optical Fiber Communication Senior
- 6. Mobile Communication Shiller

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Credits: 04 (60 Periods)

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Punyashlok Ahilyadevi Holkar Solapur University, Solapur B.Sc.-III (Electronics) CBCS PatternSemester –V&VI List of Experiments

Group A

- 1. Study of Operational amplifier as band pass / band stop filter
- 2. Application of PLL (Frequency Multiplication)
- 3. Design of Regulated Power Supply using IC LM317/337)
- 4. Design of Log amplifier by using Operational amplifier
- 5. Study of F to V converter / V to F converter (LM331)
- 6. Study of SCR firing by UJT
- 7. Study of Full Wave Controlled Rectifier
- 8. Design of Light Dimmer circuit by using TRIAC
- 9. Study of Speed control of motor using SCR
- 10. Study of SMPS / Study of Chopper circuits (Step- Up)

<u>Group B</u>

- 1. Data transfer operations using microcontroller
- 2. Arithmetic operations using microcontroller
- 3. Logical operations using microcontroller
- 4. Thumb Wheel and seven segment display interface using microcontrollerusing embedded C
- 5. Interfacing of stepper motor with microcontroller using embedded C
- 6. Square wave generation with timer using embedded C
- 7. Interfacing of ADC/ DAC using embedded C
- 8. Interfacing of 16×2 LCD display using embedded C
- 9. Serial communication with PC using embedded C
- 10. DC motor control with PWM using embedded C

Group C

- 1. Study of strain gauge (load cell)
- 2. Study of temperature sensor PT 100.
- 3. Study of LVDT
- 4. Study of offset voltage compensation circuit
- 5. Design of circuit for measurement of electric conductivity of water
- 6. Design of Light activated turn ON/OFF circuit
- 7. Design of ON-OFF temperature controller
- 8. Programmable gain amplifier (AD 620)
- 9. Programmable gain amplifier (AD 595)
- 10. Instrumentation Amplifier by using LM324/TL084.

Group D

D1 : Biomedical Electronics

- 1. Build and test the Bio Potential Amplifier.
- 2. Study of instrumentation amplifier INA 126.
- 3. Measurement of Bioelectric Potential
- 4. Study of PQRS Response
- 5. Measurement of Heart rate

D2 : Electronics Communication

- 1. Study of Tuned RF amplifier
- 2. Study of Tuned IF amplifier

- 3. Study of amplitude modulation and demodulation
- 4. Study of Frequency Modulation
- 5. Study of PWM

D3: Virtual Instrumentation

- 1. Study of front panel and block diagram windows of LabVIEW.
- 2. Design and simulation of instrumentation amplifier by usingLabVIEW/Proteus
- 3. Design and simulation of temperature measurement system by usingLabVIEW/Proteus
- 4. Simulation of interfacing ADC to microcontroller by usingLabVIEW/Proteus
- 5. Simulation of interfacing LCD to microcontroller by usingLabVIEW/Proteus

D4: Modern Communication System

- 1. Data communication using OFC
- 2. Study of FSK modulation
- 3. Time Division Multiplexing
- 4. Study of DTMF decoder
- 5. Study of AGC circuit

Note :

- Minimum eight experiments from group A to C should be performed by thestudents.
- Group D is Discipline specific elective (DSE-1) group. Students have to opt anytwo sub groups, from D1 to D4, as per elective papers and they have to perform inimum 4 experiments, each from elected two sub-groups.
