Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR
416 004, MAHARASHTRA
PHONE : EPABX – 2609000, BOS Section – 0231-2609094, 2609487
Web : www.unishivaji.ac.in Email: bos@unishivaji.ac.in
शिवाजी विद्यापीठ, कोल्हापूर
४१६ ००४, महाराष्ट्र
दूरध्वनी - इपीबीएक्स - २०६०९०००, अभ्यासमंडळे विभाग : ०२३१- २६०९०९४, २६०९४८७
वेबसाईट : www.unishivaji.ac.in ईमेल : bos@unishivaji.ac.in

SU/BOS/Sci & Tech/ 444 **Date: 01/08/2024**

To,

The Principal,
All Concerned Affiliated College/ Institutions,
Shivaji University, Kolhapur.

Subject: Regarding New syllabi of **B. Tech. Programme (CBCS)** under Faculty of Science & Technology

Sir/Madam,

With reference to the subject mentioned above, I am directed to in form you that the university authorities have accepted and granted approval to the revised of **B. Tech. Programme (CBCS)** under Faculty of Science & Technology.

B. Tech (Branch) CBCS Syllabus -2024-25		
No.	**BOS/Ad-hoc Board**	**Course Syllabus**
1	Computer Science Engineering and Technology	B.Tech. Part-IV (Sem-VII-VIII) Artificial Intelligence & Machine Learning (AIML)
		B.Tech. Part-III (Sem-V-VI) Artificial Intelligence & Data Science (AIDS)
2	Electronics Sciences, Electronics Engineering and Technology	B.Tech. Part-III (Sem-V-VI) Elecronics & Computer Science Engineering

This syllabus and equivalence shall be implemented from the academic year 2024-2025 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in. (Online Syllabus)

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dr. S. M. Kubal
Dy. Registrar

Copy to:

1	The I/c Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	The Chairpersan, Respective Board of Studies	7	Affiliation Section (T.1) (T.2)
3	OE 4	8	P.G.Admission Section, P.G Seminar Section
4	Eligibility Section,	9	Computer Centre

SHIVAJI UNIVERSITY, KOLHAPUR

SYLLABUS AND STRUCTURE

THIRD YEAR (B. Tech.)

Electronics & Computer Science

To be introduced from the academic year 2024-25

(i.e., from June 2024) onwards

Semester V

Sr. No	Code No.	Subject	Semester	Credits
1	PCC-ECS-501	Signal & System	5	4
2	PCC-ECS-502	Power Electronics	5	4
3	PCC-ECS-503	Computer Organization & Architecture	5	3
4	PCC-ECS-504	Computer Network II	5	4
5	PEC-ECS-501	Elective - I	5	3
6	PCC-ECS-505	Java Programming	5	4
		Total		22

Semester VI

Sr. No	Code No.	Subject	Semester	Credits
1	PCC-ECS-601	Digital Signal Processing	6	4
2	PCC-ECS-602	PLC & Automation	6	4
3	PCC-ECS-603	Software Engineering	6	3
4	PCC-ECS-604	Python Programming	6	5
5	PEC-ECS-601	Elective – II	6	4
6	EL-ECS-601	Mini Project II	6	2
		Total		22

*****For Theory CIE 30 Marks,**

Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.

*****Guidelines to paper setter:**

In theory ESE examination of 70 marks following pointes should be considered,

1. First question of 10 marks should be allotted to Objective type questions.
2. In Remaining 60 marks, four questions of 15 marks should be considered.

SECOND YEAR ELECTRONICS & COMPUTER SCIENCE – CBCS PATTERN

Semester Examination

Sr. No	Course (Subject Title)	TEACHING SCHEME									EXAMINATION SCHEME										
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM WORK		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min
SEMESTER V																					
1	PCC-ECS-501	3	3	3	1	1	1	-	-	-		CIE	30	100	40	As per BOS Guidelines				25	10
												ESE	70								
2	PCC-ECS-502	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
3	PCC-ECS-503	3	3	3	-	-	-	-	-	-		CIE	30	100	40		-	-		25	10
												ESE	70								
4	PCC-ECS-504	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
5	PEC-ECS-501	3	3	3	-	-	-	-	-	-		CIE	30	100	40		-	-		25	10
												ESE	70								
6	PCC-ECS-505	2	2	2	-	-	-	2	4	4		-	-	-	-		50	20		25	10
	TOTAL	**17**	**17**	**17**	**1**	**1**	**1**	**4**	**8**	**8**				**500**			**150**			**150**	60
SEMESTER VI																					
1	PCC-ECS-601	3	3	3	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines				25	10
												ESE	70								
2	PCC-ECS-602	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
3	PCC-ECS-603	3	3	3	-	-	-	-	-	-		CIE	30	100	40					25	10
												ESE	70								
4	PCC-ECS-604	3	3	3	-	-	-	2	4	4		CIE	30	100	40		50	20		25	10
												ESE	70								
5	PEC-ECS-601	3	3	3	-	-	-	1	2	2		CIE	30	100	40					25	10
												ESE	70								
6	EL-ECS-601	-	-	-	-	-	-	2	4	4							50	20		25	10
	TOTAL	**15**	**15**	**15**	**-**	**-**	**-**	**7**	**14**	**14**				**500**			**150**			**150**	60
	TOTAL	**32**	**32**	**32**	**1**	**1**	**1**	**11**	**22**	**22**				**1000**			**300**			**300**	

CIE- Continuous Internal Evaluation. ESE – End Semester Examination

• Candidate contact hours per week: 30 Hours (Minimum)	• Total Marks for T.E. Sem V & VI: 1600
• Theory and Practical Lectures: 60 Minutes	• Total Credits for S.E. Sem V & VI: 22
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **PCC-ECS:** Professional Core course –Electronics & Computer Science Engineering are compulsory.
2. **PEC-ECS:** Program Elective course
3. **EL- ECS:** Experiential Learning.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING.

Signal & System

Course Details

Class:	T. Y. B. Tech Sem - V
Course Code and Course Title	PCC-ECS-501- Signal & System
Prerequisites	
Teaching scheme: Lecture /Practical/Tutorial	3/0/1
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: 01 Hour / week	TW: 25 Marks

Objectives:

The course is aimed

1 To understand basic of CT & DT signals and their representation.
2 To understand basic of CT & DT system and their representation
3 To analyze CT & DT signals using Fourier transform
4 To compute DFT and IDFT
5 To analyze signals using Z-transform
6 To apply realization techniques for systems

Course Outcomes:

On successful completion of course learner will be able to;

1 Demonstrate use of signals and their representation.

2 Represent CT & DT system

3 Use Fourier transform for analysis of CT & DT signals

4 Compute DFT and IDFT

5 Analyze signals using Z-transform

6 Realize the systems

Section - I

UNIT NO	CONTENTS	HOURS
1	**Signals and Classification of Signals** Continuous time signals & discrete time, analog & digital, even &odd signals, periodic &non-periodic, deterministic &non-deterministic, energy & power, Basic CT & DT signals: unit impulse, unit step, unit ramp, complex exponential & sinusoidal, Basic operations on signals, sampling and reconstruction of signal	7
2	**System and Classification of Systems** System Representation, properties of systems: continuous time Systems & discrete Systems, system with and without memory, causal and non-causal system, linear and nonlinear system, Time invariant and time variant system, Stability of system, Impulse response representation, convolution integral, convolution sum, properties of convolution.	7
3	**Fourier Transform** Fourier Transform, Fourier Transform of CT and DT signals, Properties of Fourier Transform, Fourier transform using properties, Limitations of Fourier Transform.	7
Section-II		
4	**Discrete Fourier Transform** Discrete Time Fourier Transform, Discrete Fourier Transform, Inverse Discrete Fourier Transform (IDFT): Direct method, DFT using Twiddle factor, Properties**,**	7
5	**Z transform:** Introduction of Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform, Inverse Z-transform: long division method, PFE method, residue method.	8
6	**System Realization** Continuous time system representation by differential equation, discrete time system representation by difference equation, transfer function in Z-domain, Realization of discrete time systems by Direct from I and Direct Form II	6
	Total	42

Text Books:

1 S. Palani, “Signals and Systems”, Ane Books Pvt. Ltd

2 P. Ramesh Babu, R. Ananda natarajan, “Signals and Systems” 4th Edition,

SCITECH publication

3 A. Anand Kumar, “Signals and Systems”, PHI publication

Reference Books:

1. Alan Oppenheim, Alan S. Willsky, "Signals and Systems", 2nd Edition, PHI Publication.
2. Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley Publication
3. Michael J. Roberts, "Fundamentals of signals & systems", Tata McGraw Hill Publication, 2007.

General Instructions:

1)For the term work of 25 marks, batch wise tutorials are to be conducted. The number of students per batch per tutorial should be as per university rules.

2)Number of assignments should be at least six (All units should be covered).

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Power Electronics

Course Details

Class	T. Y. B. Tech Sem - V
Course Code and Course Title	PCC-ECS-502- Power Electronics
Prerequisites:	Semiconductor Theory
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02Hrs/week	ESE: 50 Marks

Course Objectives:

1. Make students aware of semiconductor power devices with its firing circuits.
2. Prepare students to design and simulate Controlled rectifier circuits.
3. Make students aware to the Utilization of Choppers and Inverters
4. Explain Industrial applications of Power Electronics Circuits.

Course Outcomes:

After successful completion of the course students will be able to:

1. Understand the characteristics of various power electronics devices
2. Understand the different firing circuits of thyristor.
3. Analyze controlled rectifier circuits.
4. Study of invertors using MOSFET & IGBT.
5. Analyze the different types of choppers.
6. Understand the Industrial applications of Power circuits.

Section - I

Unit	CONTENTS	Hours
1	**Semiconductor Power Devices** Construction and V-I Characteristics, Dynamic Characteristics during turn on, turn off, SCR Turn off methods: Class A, Class B, Class C, Class D, Class E, & Class F, dv/dt & di/dt protection circuits. Construction, working, & V-I Characteristics of Diac, Triac, GTO, Power MOSFET and IGBT.	08
2	**Firing Circuits of SCR** Turn On methods of SCR, UJT triggering circuits with design, PUT, Diac and Triac triggering circuits, Cosine based firing for bridge-controlled converter. Need of Isolation. Pulse transformer & Optocoupler based isolation techniques.	06
3	**Controlled Rectifiers** Single Phase Half wave, Full wave, Half controlled and Full controlled converters with R & RL Load, effect of Freewheeling Diode. Calculations of performance parameters and Numerical expected.	07
Section - II		
4	**Inverters using MOSFET/IGBT's** Principle and operation of Single-phase half bridge and full bridge inverters. Harmonic reduction techniques of inverter: Quasi square wave, Multiple PWM and sine wave PWM. (Analytical treatment not expected)	06
5	**Choppers and its Applications** a) Basic principles of choppers, time ratio control and current limit control techniques, voltage commutated chopper circuit, Jones chopper, Morgan's chopper, step-up chopper and AC chopper. b) Speed control of DC series motors using chopper, speed control of DC shunt motor using phase-controlled rectifiers.	07
6	**Industrial Applications** Static circuit breakers, over voltage protectors, zero voltage switch, integral cycle triggering, time delay method, soft start method. Non drive applications using induction heating and Dielectric heating, switched mode power supply (SMPS), Uninterrupted power supply (UPS), Battery charger, light dimmer using triac and diac, A.C. voltage stabilizer –Relay type, Servo type	08
Total		42

Text Books:

1. P. S. Bhimbra, "Power Electronics", Khanna Publication
2. P. C. Sen, "Power Electronics", MGH publication.
3. M. D. Singh & Khan Chandani, "Power Electronics", McGraw Hill publication,

Reference Books:

1. Ned Mohan: Power Electronics; Wiley Pub

2. M. H. Rashid, "Power Electronics", Pearson.

3. V. R. Moorthi, "Power Electronics: Devices, Circuits and Industrial Applications", Oxford University Press

List of Experiment: (Minimum 08 Experiments are to be performed.)

1. Experiment on V-I Characteristics of SCR TRIAC, DIAC.
2. Study of V-I Characteristics of MOSFET/IGBT/GTO
3. Study of Firing circuits using UJT as relaxation oscillator/RAMP- Pedestal Circuit
4. Study of Firing circuits using TRIAC, DIAC
5. Study of Half controlled Bridge rectifier
6. Study of Fully controlled Bridge rectifier
7. Study of AC voltage Regulator
8. Study of Jones chopper and Morgan's chopper
9. Study of Single-phase Inverter
10. Study of SMPS/UPS
11. Study of Light dimmer using Diac/Triac
12. Study of A.C. Voltage stabilizer

Note: These experiments can be performed on virtual lab also.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Computer Organization & Architecture

Course Details

Class	T. Y. B. Tech Sem - V
Course Code and Course Title	PCC-ECS-503- Computer Organization & Architecture
Prerequisites	
Teaching scheme: Lecture /Practical/Tutorial	3/0/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: NA	ESE: NA

Course Objectives:

1. To introduce the learner to the design aspects which can lead to maximized performance of a computer.
2. To introduce basic concepts and functions of operating systems.
3. To understand the concepts of process synchronization and deadlock.
4. To understand various Memory, I/O and File management techniques
5. To introduce the learner to various concepts related to Parallel Processing
6. To highlight the various architectural enhancements in modern processors.

Course Outcomes:

After successful completion of the course students will be able to

1. Define the performance metrics of a computer

2.Explain the design considerations of Processor, Memory and I/O in Computer systems

3.Interpret the objectives and functions of an Operating System

4 Analyze the concept of process management and evaluate performance of process scheduling algorithms

5. Evaluate the advantages and limitations of Parallelism in systems

6. Discuss the various architectural enhancements in modern processors

Section-I

Unit	CONTENTS	Hours
I	**Introduction to Computer Organization** 1.1 Fundamental Units of a Computer, Basic Measures of Computer Performance - Clock Speed, CPI, MIPs and MF lops 1.2 Number Representation methods- Integer and Floating-point	04
2	**CPU Design** 2.1 CPU Architecture, Register Organization, Instruction cycle, Instruction Formats 2.2 Control Unit Design- Hardwired and Micro-programmed Control: Vertical and Horizontal Micro-Instructions, Nano-programming 2.3 Comparison between CISC and RISC architectures	06
3	**Memory and I/O Organization** 3.1 Classification of Memories-Primary and Secondary Memories, ROM and RAM, Memory Inter- leaving 3.2 Memory Hierarchy, Cache Memory Concepts, Mapping Techniques, Write Policies, Cache Coherency 3.3 Virtual Memory Management-Concept, Segmentation, Paging, Page Replacement policies 3.4 Types of I/O devices and Access methods, Types of Buses, Bus Arbitration	09
Section-II		
4	**Operating System concepts** 4.1 Concept of a Process, Process States, Process Description, Process Control Block 4.2 Process scheduling -Pre-emptive and Nonredemptive scheduling algorithms (FCFS, Priority, SJF), Concept of Multi-Threading 4.3 Inter-Process Communication, Process Synchronization, Deadlock and Prevention 4.4 File Management -File Organization and Access 4.5 I/O Management and Disk Scheduling: FCFS, SSTF	10
5	**Parallelism** 5.1 Introduction to Parallel Processing Concepts, Flynn's classification, Amdahl's law 5.2 Pipelining - Concept, Speedup, Efficiency, Throughput, Types of Pipeline hazards and solutions	07
6	**Architectural Enhancements** Superscalar Architectures, Out-of-Order Execution, Multi-core processors, Clusters, GPU	06
Total		42

Text Books:

1. William Stallings, “Computer Organization and Architecture: Designing for Performance”, Eighth Edition, Pearson.

2. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization", McGraw Hill,2002.

3. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition

4. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley &Sons, Inc., 9th Edition,

Reference Books:

1. P. Hayes, "Computer Architecture and Organization", McGraw-Hill,1998.

2. B. Govindarajulu, “Computer Architecture and Organization: Design Principles and Applications”, Second Edition, Tata McGraw-Hill.

3. D. A. Patterson and J. L. Hennessy, "Computer Organization and Design - The Hardware/Software Interface", MorganKaufmann,1998.

4. Achyut Godbole and Atul Kahate, Operating Systems, McGraw Hill Education, 3rd Edition

5. Andrew Tannenbaum, Operating System Design and Implementation, Pearson, 3rd Edition

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Computer Network II

Course Details

Class	T. Y. B. Tech Sem - V
Course Code and Course Title	PCC-ECS-504- Computer Network II
Prerequisites	
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/Week	ESE: 50 Marks

Course Prerequisite:

Computer Network I

Course Objectives:

1. To understand the Client server model & socket interface
2. To perceive IPv6 addressing and protocol
3. To explain and learn basic internet technology protocols
4. Simulate protocols using software tools.

Course Outcomes:

After successful completion of the course students will be able to;

1. program the client server model using sockets
2. understand and apply next generation protocol and addressing model
3. elaborate the fundamentals of Domain Name Systems
4. apply the concepts of Remote login and FTP in network applications
5. learn fundamentals of web, HTTP and e-mail communication protocols.
6. understand multimedia streaming and relevant protocols.

Section-I

UNIT	CONTENTS	HOURS
1	**Client server model & socket interface:**	07
	The Socket Interface, The Client Server model and Software design, Concurrent processing in client-server software, Algorithms and issues in Client-Server design, Multiprotocol Servers, Multiservice Servers, Concurrency in clients, Unix Internet Super server (in etd).	
2	**Next Generation IPv6 and ICMPv6:**	07
	IPV6 addresses, packet format, ICMPV6, Transaction from IPV4 to IPV6	
3	**BOOTP, DHCP and Domain name system:**	07
	Name Space, Domain Name Space, Distribution of name space, and DNS in internet, Resolution, DNS massages, Types of records, Compression examples, and encapsulation. BOOTP, DHCP	
Section-II		
4	**Remote Login: TELNET and File Transfer FTP, TFTP:**	07
	Concept, NVT, Embedding, Options & options/sub-option negotiation, controlling the server, Out-of-band signaling, Escape charter, Mode of operation, user interface. FTP: Connections, Communication, Command processing, File transfer, User interface, Anonymous FTP, TFTP.	
5	**Web Applications Service Protocols:**	07
	HTTP: Architecture, Web Documents, HTTP Transaction, Request and Response, HTTP Headers and Examples, Persistent Vs Non-Persistent HTTP, Proxy servers. Electronic Mail: Architecture, User agent, addresses, Delayed delivery, SMTP commands and responses, Mail transfer phases, MIME, POP3	
6	**Multimedia In Internet:**	07
	Streaming stored audio/video, Streaming live audio/video, Real time interactive audio/video, Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Voice Over IP (VoIP), Session Initiation Protocol (SIP)	
	Total	42

Text Books:

1. TCP/IP Protocol Suite by Behrouz A. Forouzan McGraw-Hill Publication, 4thEdition.
2. Computer Networks by Andrew S Tanenbaum.

Reference Books:

1. Data Communications and Networking by Behrouz A Forouzan

2. Internetworking with TCP/IP by Douglas Comer

3. Computer Networking: A Top-Down Approach by Jim Kurose

Term work: It should consist of minimum 8 - 10 experiments based on the following guidelines

1. Client program using UDP to connect to well-known services (echo, time of the day service etc.).

2. Implementing concurrent TCP multiservice client/server.

3. Implementing Iterative UDP client/server.

4. Study of following DNS Tools with all its options. nslookup, dig, host, whois.

5. Implement trivial file transfer protocol (TFTP).

6. Configuration of basic services for FTP, HTTP, Telnet etc. on Linux Platform

7. Write program to send a mail using SMTP commands and receive a mail using POP3commands.

8. Capturing & Analyzing operation of various application layer protocols using network protocol analyzer. (Wireshark and tcp dump)

9. Study of various streaming multimedia protocols in Internet (Using various audio/video streaming services on the Internet)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Sensors and applications (Elective -I)

Course Details

Class	T. Y. B. Tech Sem - V
Course Code and Course Title	PEC-ECS-501 Sensors and applications
Prerequisites	Electronic devices
Teaching scheme: Lecture /Practical/Tutorial	3/0/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: 01 Hr./Week	TW: 25 Marks
Practical: NA	ESE: NA

Course Objectives:

1. Explain the operation/working principle of different sensors.
2. Compare various sensors and select appropriate sensor for a particular application.
3. To impart interdisciplinary knowledge regarding sensors and actuators.
4. Explain the advanced sensor fabrication techniques like MEMS.
5. Explain industrial applications of sensors and transducers.

Course Outcomes:

After successful completion of the course students will be able to:

CO1: Classify sensors/transducers and describe important performance measures, terminology of sensors/instrumentation systems.

CO2: Compare various temperature sensors, design signal conditioning circuits for temperature sensors and describe working principles of chemical sensors.

CO3: Compare various flow and level sensing techniques and select appropriate technique for a specific application.

CO4: Describe working principles of motion, light and radiation detectors.

CO5: Describe construction and working principle of MEMS and SMART sensors.

CO6: Select appropriate Switches and final control elements for a specific application

Section-I

Unit No.	Contents	Hrs.
1	**Fundamentals of Sensors & Transducer**	07
	Definitions sensors & transducer, Classification of sensors and transducers, Performance and Terminology: Accuracy, precision, resolution, threshold, sensitivity, linearity, hysteresis, drift, range, span, speed of response, measuring lag, fidelity, dynamic error. Advantages, disadvantages & applications of sensors and transducers, Block diagram and description of Instrumentation system. Instrument calibration-definition, benefits of calibration, Measurement Standards-International System of Units (SI), Calibration Chain and Traceability, Calibration procedure.	
2	**Temperature & Chemical sensors**	07
	Temperature: RTD, thermistors, thermocouples, noncontact temperature measurement- pyrometers. Semiconductor temperature sensing (LM75), Signal conditioning circuit for RTD and Thermocouple, Interfacing technique of Temperature sensors with microcontroller. Acoustics sensors for sound level measurement, Humidity Sensors. Chemical sensors: classes of chemical sensors, Characteristics of chemical sensors, biochemical sensors, electronics noses.	
3	**Flow and Level Sensing**	07
	Flow: Bernoulli Equation, Differential head type flow meters (Orifice, Venturi tube and Flow Nozzle), Pitot static tube, Variable area type flow meter – Rotameter, vortex shedding, Electromagnetic, ultrasonic flow meters, hot wire anemometers. Level: Float, DP Cell, Ultrasonic, Capacitance probe type, Hydrostatic pressure and nuclear level detection techniques.	
Section-II		
4	**Weight, Motion, Light & Radiation Detectors**	07
	Weight- Load Cell and strain gauges, strain gauge signal conditioning. Displacement- LVDT, Ultrasonic, capacitive detectors, Proximity sensors (inductive, optical and capacitive) Velocity-Absolute and incremental encoders. Acceleration– Accelerometer characteristics, capacitive accelerometers, Piezoelectric Accelerometer, Piezo-resistive accelerometer, thermal accelerometer. Light & Radiation detectors: Photo diodes, photo transistor, CCD, CMOS image sensors, gas flame detectors, Radiation detectors	
5	**MEMS & Smart sensors**	07
	Magnetic field sensors – Hall effect and magneto-resistive elements (MRE), magneto-transistors, piezoelectric (PZT) sensors and actuators. Microelectromechanical systems (MEMS) – Bulk micromachining, micro-machined absolute pressure sensor, Surface Micromachining-Hot wire anemometer micro-miniature temperature sensor, surface micromachined accelerometer and SMART sensors.	
6	**Actuators and Final Control Elements**	07

	Pneumatic and hydraulic actuators- Directional control valves, Pressure control valves, Cylinders, Process control valves - Electrical actuators- Mechanical switches, Solid state switches, Solenoids, DC motors, AC motors and Stepper motors.	
	Total	**42**

Text Books:

1. W. Bolton; ― Mechatronics, Electronic Control Systems in Mechanical and Electrical Engineering‖; Pearson Education; 3rd Edition

2. William C. Dunn, ―Introduction to Instrumentation, Sensors, and Process Control‖, Artech House Sensors Library.

Reference Books:

1. Curtis Johnson; ― Process Control Instrumentation Technology ‖; Prentice Hall of India Pvt. Ltd.;7th Edition

2. Ernest O. Doebelin; ―Measurement System Application and Design ‖; Mc-Graw Hill; 5th Edition

3. David G. Alciatore, Michael B Histand; ― Introduction to Mechatronics and Measurement System ‖; Tata McGraw Hill

4. C.S. Rangan, G.R. Sarma, V.S.V. Mani; ― Instrumentation Devices and Systems ‖; Tata McGraw Hill; 2nd Edition.

Term Work: It should consist of minimum 8 - 10 experiments based on the following List

1. Study different types of static and dynamic characteristics of an instrument.
2. Study the term calibration.
3. Measure the temperature using RTD.
4. Measure the temperature using Thermocouple.
5. To measure the flow using Rotameter.
6. To study of electromagnetic flow meter.
7. To measure the displacement by using LVDT.
8. To measure the speed of rotor using contact and non-contact type devices.
9. To study microelectromechanical system.
10. To study pneumatic and hydraulic actuators.
11. To study electrical actuators.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Block Chain Technology (Elective -I)

Course Details

Class	T. Y. B. Tech Sem - V
Course Code and Course Title	PEC-ECS-501 Block Chain Technology
Prerequisites	Data Structure & Algorithm
Teaching scheme: Lecture /Practical/Tutorial	3/0/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: NA	ESE: NA

Course Objectives:

1. To introduce Blockchain Technology
2. To learn the distributed decentralized system.
3. To learn hashing in cryptography, Ethereum and consensus
4. To learn bitcoin and its process also the blockchain technology in allied technologies

Course Outcomes:

After successful completion of the course students will be able to:

CO1: Understand the basic concepts and architecture of Blockchain Technology

CO2: Demonstrate distributed decentralized system, its applications and regulations

CO3: Demonstrate the application of hashing in cryptography

CO4: Demonstrate the verification process through Ethereum and consensus in blockchain technology.

CO5: Illustrate the concepts of Bitcoin and its process in blockchain technology.

CO6: Understand and illustrate Block-chain with allied technologies such as cloud computing, AI, IoT, Robotics

Section-I

Unit No.	Contents	Hrs.
1	**Basics of Blockchain**	07
	Introduction, History and Concept of Blockchain, Definition of Blockchain, Fundamentals of Blockchain, Characteristics of Blockchain, Consensus in Trust-Building Exercise, Public, Private, and Hybrid Blockchains, Architecture of Blockchain, Transactions, Chaining Blocks,	
2	**Distributed Decentralized System**	07
	Introduction, Distributed Ledger Technologies (DLT), Distributed Decentralized Applications and Databases, Value Proposition of Blockchain Technology, Decentralized Enterprise, Decentralization, Disintermediation, Decentralized Enterprise Regulation.	
3	**Cryptography and Hash Functions**	07
	Cryptography, Cryptography Primitives, Symmetric Cryptography, Introduction of Hash, Asymmetric Cryptography Hashing, Message Authentication Code, Secure Hash Algorithms (SHA-1), Secure Hash Algorithm Version 3, Distributed Hash Tables, Hashing and Data Structures, Hashing in Blockchain Mining.	
Section-II		
4	**Blockchain Components & Consensus**	07
	Introduction of Ethereum, History, Ethereum Virtual Machine, Working of Ethereum, Ethereum Clients, Ethereum Key Pairs, Ethereum Addresses, Ethereum Wallets, Ethereum Transactions, Ethereum Languages, Ethereum Development Tools Introduction, Consensus Introduction, Consensus Approach, Consensus Algorithms, Byzantine Agreement Methods	
5	**Bitcoins**	07
	Introduction, Working of Bitcoin, Merkle Trees, Bitcoin Block Structure, Bitcoin Address, Bitcoin Transactions, Bitcoin Network, Bitcoin Wallets, Bitcoin Payments, Bitcoin Clients, Bitcoin Supply	
6	**Blockchain and Allied Technologies**	07
	Blockchain and Cloud Computing, Characteristics of Blockchain Cloud, Blockchain and Artificial Intelligence, Blockchain and IoT, Blockchain and Machine Learning, Blockchain and Robotic Process Automation	
	Total	**42**

Text Books:

1. Kumar Saurabh and Ashutosh Saxena., ―Blockchain Technology: Concepts and Applications‖, Wliey Publications
2. Yathish R, Tejaswini N, ‖Blockchain for Beginners‖, Publisher: Shroff/X-Team 2019 Edition

3. Don Tapscott, author of Wikinomics, Alex Tapscott, ― Blockchain Revolution: How the technology behind bitcoin and other cryptocurrencies is changing the world‖, Penguin Publishing Group

Reference Books:

1. Narayanan, Bonneau, Felten, Miller and Goldfeder, ―Bitcoin and Cryptocurrency Technologies – A Comprehensive Introduction‖, Princeton University Press.

2. Josh Thompson, _Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming ‘, Create Space Independent Publishing Platform, 2017.

3. Imran Bashir, ―Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained‖, Packet Publishing.

4. Merunas Grincalaitis, ―Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols‖, Packt Publishing

Term Work: It should consist of minimum 8 - 10 experiments based on the following List

1. Creating Merkle tree
2. Creation of Block
3. Block chain Implementation Programming code
4. To study of cytography and hash function.
5. To study of distributed decentralized system.
6. Creating ERC20 token
7. Java code to implement blockchain in Merkle Trees
8. Java Code to implement Mining using block chain
9. Java Code to implement peer-to-peer using block chain
10. Creating a Crypto-currency Wallet.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Java Programming

Course Details

Class	T. Y. B. Tech Sem - V
Course Code and Course Title	PCC-ECS-505 Java Programming
Prerequisites	C++
Teaching scheme: Lecture /Practical/Tutorial	2/2/0
Credits	4

Evaluation scheme CIE/ESE for Practical

Teaching scheme	Examination scheme
Lectures: 02 Hours/week	Theory: NA
Tutorial: NA	TW: 25 Marks
Practical: 04Hrs/week	ESE: 50 Marks

Course Objectives:

The course aims to:

1. To introduce the concept of object-oriented programming using java.
2. To learn how to implement reliable and secure application using exception handling and package concept.
3. Have the ability to write program to perform file operations.
4. To understand how to design components with java Swing API and present mechanism of multithreading.
5. To familiarize database connectivity through JDBC and learn the collection framework.
6. To explore the concept of networking and web programming using java servlet and jsp.

Course Outcomes:

Upon successful completion of this course

1. Students will be able to articulate the principle of object-oriented problem solving & programming.

2. Students will be able to illustrate code reusability, security and abstraction using inheritance, package and interface.

3. Students will be able to develop reliable and user-friendly applications using exception handling and file handling.

4. Students will be able to create desktop apps using SWING and event handling and also illustrate multithreading concepts.

5. Students will be able to use JDBC & collection framework.

6. Students will be able to apply network programming concept & develop web applications using servlet and jsp.

Section - I

Unit	CONTENTS	Hours
1	Fundamental Programming in Java: The Java Buzzwords, The Java Programming Environment- JVM, JIT Compiler, Byte Code Concept, Hotspot, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays-Jagged Array. Objects and Classes: Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Controlling Access to Class Members, Static Fields and Methods, this keyword, Object Cloning, Class Design Hints,	04
2	Inheritance, Interface and Packaging: Inheritance: Definition, Super classes, and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword, Final Classes and Methods, Abstract Classes and Methods, casting, Design Hints for Inheritance, Nested classes & Inner Classes, finalization and garbage collection. Interfaces: Defining an Interface, Implementing an Interface, Using an Interface as a Type, Evolving Interfaces, and Default Methods. Packages: Class importing, creating a Package, naming a Package, Using Package Members, Managing Source and Class Files. Developing and deploying (executable) Jar File.	05
3	Exception and I/O Streams: Exception: Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause, Advantages of Exceptions, Tips for Using Exceptions. I/O Streams: Byte Stream – Input Stream, Output Stream, Data Input Stream, Data Output Stream, File Input Stream, File Output Stream, Character Streams, Buffered Stream, Scanner, Random File Access File.	04
Section - II		
4	Graphical User Interfaces using Swing and Multithreading Introduction to the Swing, Swing features, Swing Top Level Containers-Creating a Frame, positioning a Frame, Displaying Information in a Panel, The Model-View-Controller Design Pattern, The J Component Class. Layout Management: Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout	04

	Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low- Level Events in the AWT, Low Level Event Types User Interface Components: Text Input, Choice Components, Menus, Dialog Boxes Setting the Look and Feel of UI, Introduction to J Applet Multithreading: Processes and Threads, Runnable Interface and Thread Class, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Thread States, Thread Properties, Joins, Synchronization	
5	Collection and Database Programming Collections: Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework Database Programming: The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Metadata, Row Sets, Transactions	05
6	Networking and Web: Networking: Overview of Networking, Networking Basics, Working with URLs, creating a URL, parsing a URL, Reading Directly from a URL, connecting to a URL, reading from and Writing to a URL Connection, Sockets, reading from and Writing to a Socket, Writing the Server Side of a Socket, Datagram, Writing a Datagram Client and Server. Servlet and JSP: Introduction to Servlet, the servlet Lifecycle, Retrieving Information and Sending Information, Database Connectivity using servlet, Introduction to JSP, Writing Scriplets, the jsp Lifecycle, Retrieving Information and Sending Information, Database Connectivity using jsp	06
	Total	28

Text Books:

1. Core Java- Volume I Fundamentals Cay Horstmann and Gary Cornell Pearson, Eight edition
2. Core Java- Volume II Advanced Features Cay Horstmann and Gary Cornell Pearson, Eight edition
3. Java Servlet Programming Jason Hunter O'Reilly Publication, 2nd Edition
4. Core-Servlet and Java Server Pages Volume – 1 Marty Hall, Larry Brown Pearson Education

Reference Books:

1. JAVA-The Complete Reference Herbert Schildt McGraw Hill, Oracle Press Ninth edition
2. Head First Java Eric Freeman Elisabeth Robson Bert Bates Kathy Sierra O'Reilly Publication3 rd edition
3. Head First Servlets and JSP Bryan Basham, Kathy Sierra, Bert Bates O'Reilly Publication 2nd Edition

List of Experiments:

Minimum 15 experiments should be conducted based on above topics and covering following list.

1. Create a class called Employee that includes three pieces of information as instance variables- first name, a last name and a monthly salary.
2. Create class Savings Account.
3. Create Vehicle Interface with name, max Passanger, and max Speed variables.
4. Create abstract class Shape which has instance variables side, area and perimeter
5. Create the interface stack which has variable size, abstract methods push (), pop (), display (), overflow () and underflow (). We need to implement 3 subclasses Integer Stack, String Stack and Double Stack respectively by implementing interface.
6. Develop a mathematical package for Statistical operations like Mean, Median, Average, Standard deviation.
7. Develop application which can handle any 5 combination of predefined compile time and runtime exceptions using multiple catch blocks.
8. Develop a Bank Account class which should contain all methods of Bank i.e. balance Enquiry (), withdraw (), transfer () and deposit ().
9. Take file name as input to your program through command line, if file exists the open and display contents of the file
10. Take Student information such as name, age, weight, height, city, phone from user and store it in the file using Data Output Stream and File Output Stream and Retrive data using Data Input Stream and File Input Stream and display the result.
11. Develop a Swing GUI based standard calculator program. Use event handling, Layout of swing package.
12. Create Stop Watch with Swing GUI and Multithreading. Provide Facility for Lap Counting.
13. Write a program to read a text file one line at a time. Read each line as a String and place that String object into a LinkedList.
14. Fill a HashMap with key-value pairs. Print the results to show ordering by hash code. Extract the pairs, sort by key, and place the result into a Linked HashMap.
15. Write a GUI based program to create a student registration and Login. Store Registration data in Database and take Login information from Database.
16. Create GUI Based chat application using TCP or UDP.
17. Design a student registration form which contains all the registration details and after registration display success page which should display all the entered details.

18. Write a program to store the above form information in database. And while login check with database. Display all student names in home page.

SHIVAJI UNIVERSITY, KOLHAPUR.

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING,

Digital Signal Processing

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	PCC-ECS-601- Digital Signal Processing
Prerequisites	Signal and system
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/week	ESE: NA

Course Objectives:

1 To understand Fast Fourier Transform and Fast Convolution

2 To understand design of digital FIR filters using various methods

3 To understand design of digital IIR filters using various methods

4 To understand the key architectural features of DSP Processor

5 To understand the basic concept of Multirate digital signal processing

6 To understand the basic concept of wavelet transform

Course Outcomes:

After successful completion of the course students will be able to

1 Make use of FFT algorithm for filtering of long duration sequences

2 Design digital FIR filters

3 Design digital IIR filters

4 Implement FIR and IIR filters using DSP Processor

5 Apply the basic concept of Multirate digital signal processing

6 Apply the basic concept of wavelet transform

Section-I

Unit	CONTENTS	Hours
1	**Discrete Fourier Transform & FFT Algorithms** Computational Complexity of DFT, Fast Fourier transform algorithms – Radix -2 DIT and DIF for DFT and IDFT computations, Circular convolution, Fast Convolution: Overlap-Add and Overlap-save algorithm. (Numerical)	7
2	**FIR Filter Design**	7
	Characteristic of FIR filter, properties of FIR filter, type of FIR filter Fourier series method, frequency sampling, Fourier series & windowing method.	
3	**IIR Filter Design**	7
	Analog filters approximations, mapping of S-plane to Z-plane, Design of IIR using Impulse Invariance Method, Bilinear Transformation method, Frequency Transformation, Filter design methods: Butterworth filters, Chebyshev filters and its conversion to digital filter.	
Section-II		
4	**Realization of Digital filters**	8
	FIR and IIR filter realization in cascade form and parallel form Effect of finite word length on realization. Introduction to DSP processors: TMS320C67XX, Architecture, Functional Units, pipelining, Registers, Addressing modes.	
5	**Multirate digital signal processing**	7
	Need of Multirate digital signal processing, decimation by factor D, two stage decimator, interpolation by factor I, two stage Interpolator, sampling rate conversion by rational factor I/D, applications of multirate signal processing	
6	**Wavelet Transform**	6
	Fourier Transform and its limitations, short time Fourier transform, continuous wavelet Transform, Discretization of the continuous wavelet Transform, Multiresolution Approximations; mother wavelet and Scaling functions, Haar wavelets and Daubechies wavelets, Applications of wavelet transform	
	Total	42

Text Books:

1 John G Prokis, Manolakis, “Digital Signal Processing Principles, Algorithms and Application”, Pearson Education publication

2 Salivahanam, A Vallavaraj, C. Guanapriya, “Digital Signal Processing”, Tata McGraw Hill Publication. 3 A. Anand Kumar, “Digital Signal Processing”, PHI Publications

Reference Books:

1 P. Ramesh Babu, “Digital Signal Processing, SciTech Publication

2 Sanjeet Mitra, “Digital Signal Processing”, Tata McGraw Hill Publication.

3 Alan Oppenheim, Schafer, “Digital Signal Processing”, PHI Publication

List of experiments: (Minimum 08)

1 Generation of DT signals a) Study of Unit impulse sequence b) Study of Unit step sequence c) Study of Exponential sequence d) Study of Sinusoidal sequence

2 Convolution and correlation of signals

3 Computation of DFT & IDFT using standard formula

4 Computation of DFT using FFT algorithms

5 Computation of circular convolution

6 Design of FIR LPF, HPF, BPF, BRF filter using Kaiser window

7 Design of FIR filter using frequency sampling method

8 Design of IIR LPF, HPF, BPF, BRF filter using impulse invariance method

9 Design of IIR LPF, HPF, BPF, BRF filter using bilinear transformation method

10 Computation of DCT

11 Computation of DWT

12 To implement FIR & IIR filter using TMS320C67XX processor

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

PLC and Automation

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	PCC-ECS-602- PLC and Automation
Prerequisites	Digital Electronics and Instrumentation
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hours / week	ESE:50 Marks

Course Objectives:

1. Discuss importance, purpose, functions and operations of the PLC in industrial application.

2. The ladder diagrams for industrial control applications.

3. Aware how to select the essential elements and practices needed to develop and implement the engineering automation using PLC.

Course Outcomes:

After successful completion of the course students will be able to

CO1: Apply concepts of PLC, its uses for industrial applications.

CO2: Demonstrate Relay logic instructions & PLC ladder programs for industrial applications.

CO3: Demonstrate timer, counter arithmetic, comparison functions & PLC ladder programs for industrial applications.

CO4: Make use of knowledge of Installation, troubleshooting & maintenance of PLC to provide solution for industrial automation problems.

CO5: Describe fundamentals of process control, SCADA & HMI

CO6: Select appropriate interfacing technique & communication protocol to establish communication with field devices, HMI & SCADA.

Section-I

Unit	CONTENTS	Hours
1	**PLC Overview**	7
	Definition & History of PLC, Basic structure & Components of PLC, Principle of Operation, Selection of PLC, Why Use PLC, PLC I/O Modules, Memory & How it is used, PLC advantages &Disadvantages, PLC vs Computers, Overview of Micro PLCs. Conventional ladders vs PLC Ladder logic, What is Logic? Overview of Logic functions, Number systems & Codes, Hardwired Logic vs Programmed logic, Programming word level logic instructions, Relation of digital gate logic to contact/coil logic	
2	**Basics of PLC Programming –I**	7
	Processor memory organization, PLC Programming languages, Ladder diagrams, Relays, contactors, switches, sensors, output control devices, latching relays, ladder diagram elements. Instructions: Relay type instructions, Instruction addressing, Branch Instructions, Internal Relay Instructions, Programming. Develop a PLC ladder logic diagram for given situation: A railway station has 3 platforms A, B and C. A train is coming into the station. It has to be given entry to platform A if A is empty. If both A and B are occupied then it has to be given entry to platform C. If all the platforms are full then the train has to wait.	
3	**Basics of PLC Programming –II**	7
	Basic Functions: PLC Timer & Counter functions, Timer & Counter Industrial applications, Arithmetic functions, Comparison functions, Jump functions, Data handling functions, Digital Bit functions, PLC matrix Functions, Advanced PLC Functions: Analog PLC operation, PID control of Continuous processes. Develop PLC program for following statement: Motor 1 (M1) starts as soon as start switch is ON; after 10 Seconds M1 goes off and Motor 2 (M2) starts. After 5 seconds M2 goes OFF and M3 starts. After 10 Seconds M3 goes off, M1 Starts. and the cycle is repeated. When stop switch is ON, all Motors are stop.	
Section-II		
4	**PLC Installation, Troubleshooting & Maintenance**	7
	Installation: Consideration of operating environment, receiving test, check & assembly, Electrical Noise, Leaky inputs & outputs, Grounding, voltage variations & surges, Circuit protections & wiring, Program Editing& Commissioning. Troubleshooting: Processor module, Input & Output malfunctions, Ladder logic program. PLC Maintenance.	
5	**Process control, HMI & SCADA**	7
	Types of processes, structure of control systems, on/off control, PID Control, Motion control, SCADA (Supervisory control and data acquisition): Block diagram, RTU (Remote terminal unit), Functions of RTU, MTU (Main terminal unit), functions of MTU, operating interfaces& applications, HMI (Human Machine Interface, Interfacing technique of PLC with HMI.	
6	**PLC Networking**	7

	Types of communication interface, Types of networking channels, Advantages of standard industrial network, Data Communications, Serial communication, Industrial network: CAN (Controller area network), DeviceNet, ControlNet, EtherNet/IP, Modbus, Fieldbus, Profibus-PA/DP	
	Total	**42**

Text Books:

1. Programmable Logic Controllers, Frank D. Petruzella, McGraw-Hill Education, Fourth Edition.

Reference Books:

1. Programmable logic controllers & Industrial Automation- Madhuchandra Mitra, Samarjeet Sen Gupta Penram International Pvt. Ltd., Fourth reprint, 2012

2. Programmable Logic Controllers, W. Bolton, Elsevier, Fourth Edition,2015

3. Programmable Logic Controllers, Principles & Applications‖ John W. Wobb, Ronald, A. Rais, PHI publishing, Fifth Edition

4. Introduction to Programmable Logic Controllers, Garry Dunning, Thomson, Delmar Learning, 3rd Edition

Experiments: List of Experiments: (Minimum Eight Experiments)

1. Study hardware and software used in PLC
2. Implementation Logic Gates
3. Develop a ladder program for starting an electrical motor using DOL starter
4. To develop an application using On-Delay timer.
5. To develop an application using Off-Delay timer
6. To Develop an application using UP/DOWN counter
7. To study working of PID instruction using PLC simulator.
8. To study about conveyor control system using PLC
9. Write and implement ladder logic program to on-off the DC motor using PLC
10. To study PLC installation, troubleshooting and maintenance of PLC.
11. To study of SCADA system.
12. To study different types of communication interface.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

SOFTWARE ENGINEERING

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	PCC-ECS-603- Software Engineering
Prerequisites	Electronics Devices, Digital Electronics
Teaching scheme: Lecture /Practical/Tutorial	3/0/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: NA	ESE: NA

Course Objectives:

1. To expose the students to basic concepts & principles of software engineering.
2. To make the student aware of the importance of SDLC in their project development work.
3. To expose the students to software testing techniques and software quality management.

Course Outcomes:

After successful completion of the course students will be able to;

1. Comprehend systematic methodologies of SDLC (Software Development Life Cycle)
2. Discriminate competing and feasible system requirements indicating correct real world problem scope and prepare stepwise system conceptual model using stakeholder analysis and requirement validation.
3. Prepare SRS document for a project.
4. Apply software design and development techniques.
5. Develop a quality software project through effective team-building, planning, scheduling and risk.
6. Understand testing methods at each phase of SDLC.

Section I

Unit	CONTENTS	Hours
1	**The software Problem**	7
	Cost, Schedule & Quality, Scale and Change, Software Lectures Processes: Process & Project, Component Software Processes, Software Development process Models, Project Management Process.	
2	**Software Requirements Analysis & specification**	7
	Value of Good SRS, Requirement Process, Requirements Specification, Other Approaches for Analysis, Validation	
3	**Software Planning & Scheduling**	7
	Responsibilities of Software Project Manager, Project Planning, Project Scheduling, Project Staffing, People CMM, Risk Management	
Section - II		
4	**Design**	7
	Design Concepts, Function Oriented Design, Object Oriented Design, Detail Design, Verification, Metrics	
5	**Coding & Testing**	7
	Coding & Code Review, Testing, Unit Testing, Black Box, Testing, White Box Testing, Program Analysis Tools, Integration Testing, 7 System Testing	
6	**Software Reliability &Quality Management**	7
	Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI capability Maturity Model, Six Sigma, Agile Software Development & Extreme Programming, Agile Project Management	
	Total	42

Text Books:

1. Software Engineering: A precise Approach – Pankaj Jalote (Wiley India) (Unit1,2,4).

2. Fundamentals of Software Engineering – Rajib Mall (3rd Edition)(PHI) (Unit 5,6).

3. Software Engineering by Jan Sommerville (9th Edition) Pearson (Unit 6, 7 &6.8).

4. Software Engineering Principles & Practices by Rohit Khurana ITLESL (2nd Edition) Vikas Publishing House Pvt. Ltd. (Unit3).

Reference Books:

1. Software Engineering – Concepts & Practices –Ugrasen Suman (Cenage Learning)

2. Software Engineering Fundamentals –Behforooz & Hudson (Oxford: Indian Edition1st)

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

PYTHON PROGRAMMING

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	PCC-ECS-604- Python Programming
Prerequisites	
Teaching scheme: Lecture /Practical/Tutorial	3/2/0
Credits	3+2
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 04 Hrs/week	ESE: 50 Marks

Course Objectives:

1. To define the structure and components of a Python program.
2. To learn how to write loops and decision statements in Python.
3. To learn how to write functions and pass arguments in Python.
4. To learn how to build and package Python modules for reusability.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. To Learn Basic Syntax of Python Programming.

2. To understand and implement concepts of object-oriented methodology using Python.

3. To learn collections in Python.

4. To develop problem solving skills and their implementation through Python.

Section 1

Unit	CONTENTS	Hours
1	**Introduction to Python:**	5
	an interpreted high-level language, interactive mode and script mode. Variables, Expressions and Statements, Variables and Types-mutable and Immutable variable and Keywords.	
2	**Operators and Operands in Python.**	7
	Arithmetic, relational and logical operators, Operator precedence. Expressions and Statements (Assignment statement); Taking input (using raw input () and input ()) and displaying output - print statement, Comments in Python. Conditional and Looping Construct if - else statement and nested if – else while, for, use of range function infor, Nested loops, break, continue.	
3	**Functions:**	6
	Built-In Function, invoking built in functions, Functions from math, random, time & date, User Define Function.	
Section - II		
4	**Strings:**	6
	Creating, initializing and accessing the elements; String operators: +, *, in, not in, range, slice [n:m], String built in functions & methods, Strings constants defined in string module, Regular Expression and Pattern Matching.	
5	**Lists:**	12
	Concept of mutable lists, creating, initializing and accessing the elements of list, List operations. Tuples: Immutable concept, creating, initializing and accessing the elements in a tuple; Tuple functions: cmp (), len (), max (), min (), tuple (). Sets: Concept of Sets, creating, initializing and accessing the elements of Sets operation (Membership, union, intersection, difference, and symmetric difference. Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, Traversing, Dictionary functions & Methods.	
6	**Modules:**	6
	Executing modules as scripts, The Module Search Path, “Compiled” Python files Standard Modules, the dir () Function, Packages Importing * From a Package.	
	Total	42

TEXT BOOKS:

1. Learning Python By Mark Lutz,O’Reilly Publication

2. Programming with python, A users Book, Michael Dawson, Cengage Learning

3. Python Essential Reference, David Beazley, Third Edition 5. Python Bible

REFERENCE BOOKS:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.

2. Python for Informatics: Exploring Information, Charles Severance

3. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India

4. R. Nageswara Rao, “Core Python Programming”, Dreamtech

5. Python Learning Guide (BPB publications)

TERM WORK

This course should consist of 10 to 12 programming exercises with focus on covering the hands-on aspects.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

CONSUMER ELECTRONICS (Elective II)

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	PEC-ECS-601- Consumer Electronics
Prerequisites	Basic Electronics.
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3+1
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hrs/week	ESE: NA

Course Objectives:

To acquaint students with the practical knowledge of designing and developing consumer electronic systems and products and introduce the latest trends and technologies.

Course Outcomes:

After successful completion of the course students will be able to

1. List technical specification of electronics Audio system (microphone and speaker)
2. Trouble shoots consumer electronics products like TV, washing machine and AC.
3. Identify and explain working of various color TV transmission blocks.
4. Adjust various controls of color TV receiver and troubleshoot it.
5. Use various functions of Cam coder and shoot a video and take snapshots and save them in appropriate format.

Section-I

Unit	CONTENTS	Hours
1	**Communication devices**	5
	Mobile handsets, Android technology, 2G, 3G Mobiles, i-phone, EPABX	
2	**Mass Communication devices**	7
	Color Television, Antenna, HDTV, LCD TV, LED TV, 3D Technology In TV, Interactive TV, DTHTV, Plasma TV, Video Conferencing, FAX Machine, PA System, Dolby Digital Systems, Gesture Technology In TV.	
3	**Household e1cctronics devices**	6
	Washing Machine, Microwave Oven, Types Applications, Electronics Weighing Balance, Air Conditioner, Vacuum Cleaner.	
Section - II		
4	**Printing and recording devices**	7
	LASER printer, Inkjet Printers, Photocopiers, Scanner, DVD/CD Player, Blue ray DVD Player	
5	**Special purpose machines**	9
	Electronic Voting Machine, CFL, LED Lamps, Application and Advantages. Solar lamp, Water Purifier, Electronic Calculator, DVD Player, ATM Security devices Biometric attendance Monitoring System, Working, Biometric Sensors, Home Automation System.	
6	**Compliance:**	8
	Product safety and liability issues, standards related to electrical safety and standards related to fire hazards, e.g., UL and VDE. EM1/EMC requirements and design techniques for compliance, e.g. ESD, RF interference and immunity, line current harmonics and mains voltage surge.	
	Total	42

Text Books & Reference Books:

1. Television &Video Engineering-A. M. Dhake, TMH Publication.

2. Monochrome and Color TV - R. R. Gulati, Wiley Eastern publication.

3. Video demystified -Keith Jack, PI publication

4. Audio &Video Systems-R.G.Gupta

5. Audio and Video system - Principles, maintenance and Troubleshooting by R. Gupta

6. Arora C. P., "Refrigeration and Air conditioning", Tata McGraw-Hill, New Delhi, 1994

7. Color TV Theory &Practice -S. P. Bali. TMG Hill Publication.

8. Basic TV &Video Systems-Bernard Grobb.

9. Electronic Communication Systems, Kennedy, TMH.

10. Principles of Communication Engineering- Anokh Singh-TMH.

11. C. M. Wintzer, International Commercial EMC Standards, Interference Control Techno1ologies 1988.

12. P. A. Chatterton and M. A. Houlden, EMC: Electromagnetic Theory to Practical Design. Wiley, 1992.

13. J. A. S. Angus, Electronic Product Design, Chapman and Hall, 1996.

14. Y. J. Wind, Product Policy: Concepts, Methods, and Strategy, Addison-Wesley Pub. Co. 1982.

List of Experiments: (Minimum Eight Experiments)

1. Study of 2G/3G and I phone mobiles.
2. Study of transmitter and receiver technology of television.
3. Study of FAX machine.
4. Study of different household electronics devices.
5. Study of Laser printer
6. Study of color inkjet printer.
7. Study of electronics voting machine.
8. Study of Biometric attendance Monitoring System
9. Study of electrical safety and fire hazards.
10. Study of EM1/EMC requirements and design techniques for compliance

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Internet of Things (Elective-II)

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	PEC-ECS-601- Internet of Things
Prerequisites	Sensors and applications
Teaching scheme: Lecture /Practical/Tutorial	3/1/0
Credits	3
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: 03Hrs/week	Theory: 100 Marks, 70(ESE)+30(CIE)
Tutorial: NA	TW: 25 Marks
Practical: 02 Hours/week	ESE:NA

Course Objectives:

1. To learn Internet of Things Technology
2. To know the basics of RFID, Sensor technologies.
3. To know the basics of IoT systems like Raspberry Pi, Arduino, and Banana Pi.
4. To aware students about wireless communication technologies and IoT applications.

Course Outcomes:

After successful completion of the course students will be able to

1. Students will understand basic concepts of IoT
2. students will be able to learn and implement RFID technology in various applications.
3. Students will be able to write programs for basic applications
4. Student will understand and implement different communication technologies in IoT systems.

Section-I

Unit	CONTENTS	Hours
1	**Introduction:**	5
	IoT, Objects / Things, IoT definitions, IoT frame work, Identification technologies, Internet in IoTs.	
2	**Fundamental of IoT mechanisms:**	7
	Identification of IoT objects and services, Traffic characteristics, scalability and interoperability, security and privacy, Communication capabilities, Mobility support and device power, Sensor technology, RFID technology and satellite technology.	
3	**Radio Frequency Identification Technology**	7
	RFID, IoT objects and services, principles of RFID, Components of an RFID system, RFID reader, Tags, middleware, Sensor nodes, connecting nodes, networking nodes.	
Section - II		
4	**IoT systems**	9
	Hardware and Software: Introduction to Raspberry Pi, Familiar with Raspberry Pi hardware, study of I/O ports, Programming with Raspberry Pi: Study of operating system, simple programs in C / C++, Introduction with Python programming.	
5	**Communication Technologies**	7
	WPAN Technologies: Introduction to IEEE 802.15.4 standard, Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, IEEE 802.11 WLAN, Cellular and mobile technologies.	
6	**IoT Application Examples**	7
	Smart Metering, advanced metering infrastructure, e-health / Body Area Network, City Automation (Smart City), Automotive Application, Environmental Applications, Home Automation, Control Applications	
	Total	**42**

Text Books:

1. The Internet of Things - Connecting objects to the web, Hakima Chaouchi, Wiley Publications
2. Building the Internet of Things, Daniel Minoli, Wiley Publications
3. Raspberi Pi Beginner's Guide, Gareth Halfacree, Raspberi Press
4. Introduction to Wireless Telecommunications systems and Networks, Gary J. Mulett. Cengage Learning (India Edition).

Reference Books:

1. Raspberry Pi for Dummies, Sean McManus, Mike Cook, A Wiley Brand

2. Architecting the Internet of Things, Bernd Scholz, Reiter, Springer

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND COMPUTER SCIENCE ENGINEERING

Mini Project I

Course Details

Class	T. Y. B. Tech Sem - VI
Course Code and Course Title	EL-ECS-601- Mini Project I
Prerequisites	Software Engineering, Basic Electronics.
Teaching scheme: Lecture /Practical/Tutorial	0/2/0
Credits	2
Evaluation scheme CIE/ESE for Theory	30/70

Teaching scheme	Examination scheme
Lectures: NA	Theory: NA
Tutorial: NA	TW: 25 Marks
Practical: 04Hrs/week	ESE: 50 Marks

Course Objectives:

The course aims to:

1 Provide students for knowledge of Electronics Components and soldering techniques and its package information for electronics circuit design

2 Provide students for knowledge of the assembling of electronics circuit with components on PCB (Printed Circuit Board) of circuit design.

3 Design and development of Small electronic project based on hardware and software for Electronics systems.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1 Practice acquired knowledge within the chosen area of technology for project development.

2 Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.

3 Reproduce, improve and refine technical aspects for engineering projects.

4. Work as an individual or in a team in development of technical projects.

5. Communicate and report effectively project related activities and finding

Mini project work should consist of following steps. The Mini Project topic should be based on the any one subject concept that students have studied for their Academic Year.

1. Students should propose project ideas & finalize the project idea in consultation with guide.

2. Students should submit implementation plan in the form of PERT/CPM chart, which will cover weekly activity of project report.

3. Problem definition and specification development in the form of synopsis.

4. Design of circuit with calculation & should include a) Analog part b) digital part c) Power supply d) Test strategy if firmware is required produce flow chart.

5. Simulation of design using tools like OrCAD, Matlab, etc.

6. Design of enclosure & PCB.

7. Fabrication & assembly of PCB & enclosure.

8. Testing & calibration.

9. Measurement of specifications.

Note:- 1. Project report should include report of all above steps and conclusion.

2. Project group should demonstrate and deliver seminar on project.

3. A mini project should not exceed three students per group.

Project Report Format:

Project report should be of 15 to 20 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.

1. Page Size: Trimmed A4
2. Top Margin: 1.00 Inch
3. Bottom Margin: 1.32 Inches
4. Left Margin: 1.5 Inches
5. Right Margin: 1.0 Inch
6. Para Text: Times New Roman 12 Point. Font
7. Line Spacing: 1.5 Lines
8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman
9. Headings: Times New Roman, 14 Point, Bold Face
10. Certificate: All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/Director
11. Index of Report: a. Title Sheet b. Certificate c. Acknowledgement d. Table of Contents. e. List of Figures f. List of Tables
12. References: References should have the following format