

 Estd. 1962 "A++" Accredited by NAAC (2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR - 416004, MAHARASHTRA PHONE:EPABX-2609000, www.unishivaji.ac.in, bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर - ४१६००४, महाराष्ट्र दूरध्वनी-ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१-२६०९०९४ ०२३१-२६०९४८७	 
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Ref.No.SU/BOS/Science/148

Date: 26/05/2026

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

Subject: Regarding revised syllabi of B.Sc. Part-III (Sem.V & VI) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0)

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi, nature of question paper of B.Sc. Part-III (Sem.V & VI) degree programme under the Faculty of Science and Technology as per NEP-2020 (2.0).

B.Sc. Part-III (Sem. V & VI) as per NEP-2020 (2.0)			
1.	Botany	9.	Geology
2.	Physics	10.	Zoology
3.	Statistics	11.	Chemistry
4.	Mathematics	12.	Electronics
5.	Microbiology	13.	Drug Chemistry
6.	Industrial Microbiology	14.	Pollution
7.	Biochemistry	15.	Food Science and Quality Control
8.	Computer Science (Optional)	16.	Biotechnology (Optional/Vocational)

This syllabus, nature of question and equivalence shall be implemented from the academic year 2026-2027 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in>Syllabus>Syllabus as per NEP2020.

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2026 & March/April 2027. These chances are available for repeater students, if any.

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

Thanking you,

Yours faithfully,



Dy Registrar

Encl: as above

for information and necessary action

Copy to:

1	Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	Director, Board of Examinations and Evaluation	7	I.T.Cell /Computer Centre
3	Chairman, Respective Board of Studies	8	Eligibility Section
4	B.Sc.-M.Sc. Exam Section	9	Affiliation Section (T.1) (T.2)
5	Internal Quality Assurance Cell (IQAC Cell)	10	P.G. Seminar Section



Estd. 1962 NAAC 'A++' Grade

Shivaji University, Kolhapur

Faculty of Science and Technology

Syllabus for

B.Sc. Electronics

Part- III (Semester- V & VI)

NEP2.0

(To be implemented from June 2026 onwards)

SHIVAJI UNIVERSITY, KOLHAPUR
Revised Syllabus for the Bachelor of Science in Electronics (As per NEP- 2.0)
Applicable from the Academic Year 2026 –27

1. **Title:** B. Sc. III Electronics, Shivaji University, Kolhapur Revised Syllabus as per NEP – 2.0
2. **Faculty:** Faculty of Science and Technology.
3. **Year of Implementation:** From June 2026
4. **Objectives of a Bachelor of Science (B.Sc.) in Electronics Program include:**
 - Understand the fundamental principles, laws and concepts of Electronics.
 - Develop problem-solving skills of students.
 - Gain practical experience by hands-on experience with instruments and develop laboratory skills.
 - Learn about advanced Electronics and its applications for higher studies.
 - Learn to apply conceptual knowledge to practical work.
 - Learn to interpret advanced technologies through experimental evidence.
 - Learn to analyze and interpret data accurately through scientific reasoning and experimental hypothesis testing.

5. Program Outcomes:

- | | |
|------------|---|
| PO1 | Disciplinary Knowledge: Apply broad-based knowledge of core subjects in theoretical and practical contexts. |
| PO2 | Critical Thinking and Problem Solving: Solve problems logically and make reasoned decisions based on evidence. |
| PO3 | Social Competence: Demonstrate effective communication and teamwork skills in academic and professional settings. |
| PO4 | Research & Scientific Temper: Develop scientific inquiry, hypothesis formulation, and experimental skills. |
| PO5 | Trans-disciplinary Knowledge: Connect knowledge from multiple fields to understand and solve complex issues. |
| PO6 | Personal & Professional Competence: Perform independently or collaboratively with professionalism and ethics. |

6. Program Specific Outcomes:

PSO1:- Students will be able to explain fundamental concepts of basic and applied Electronics.

PSO2:- Develop and troubleshoot automated systems using PLC Programming, Mechatronics, and Robotics to meet industrial standards.

PSO3:- Students will be able to use modern software tools like various IDE tools and Simulation Softwares.

PSO4:- Students will be able to prepare and qualify for competitive examinations

PSO5:- Students will understand good laboratory practices and safety.

PSO6:- Students will develop research-oriented skills.

7. Program Education Outcomes:

PEO-1: Students after graduation (Graduates) will possess strong analytical, critical thinking, and problem-solving skills relevant to the field in Electronics and they will be prepared for careers in various sectors, including industry, research, and government, requiring a strong foundation in Electronics.

PEO-2: Graduates will be able to utilize their practical knowledge and skills to address societal needs and challenges include areas like environmental sustainability, healthcare, energy solutions etc.

PEO-3: Graduates will demonstrate a commitment to lifelong learning and professional development, and they will possess strong communication, teamwork, and leadership skills.

PEO-4: They will be able to apply their technical knowledge and skills to solve problems and they will be prepared to adapt to the evolving landscape of the technical fields.

PEO-5: Graduates will be equipped to pursue further education, such as M.Sc. or Ph.D. in Electronics or related disciplines and will be able to work effectively in multidisciplinary and interdisciplinary environments.

PEO-6: Graduates will be equipped to innovate and develop solutions that benefit society.

8. The B. Sc. III Course (Electronics) (Level 5.5) will be of **Two Semesters (Sem. V and Sem VI)**.

9. **Pattern of Examination:** The Examinations will be conducted **semester-wise for Theory and Practical**.

10. **Fee structure:** As per Shivaji University guidelines.

11. **Eligibility Criteria for Admission to B. Sc. Part III (Level 5.5):** Please see B. Sc. Rules and Regulations of Shivaji University, Kolhapur

12. **Medium of Instruction:** English

13. **Structure of course:** Given in Framework Chart

14. **Scheme of Teaching and Examination:**

- a. Each theory course paper constitute of 4 units require 30 hours of teaching lectures and there shall be two lectures per theory (2 Cr) course per week.
- b. B. Sc. III Electronics Course will be of 44 Credits (1100 marks).
- c. Examination of each **theory course** shall be of **50 marks** (40 university examination + 10 internal assessment). University examination of 40 marks (1.5 hours' duration) will be conducted at the end of each Semester. Internal assessment of 10 marks will be done before the semester examination during each semester.
- d. Examination of practical course shall be of 100 marks (4 Cr) and 50 marks (2 Cr) per semester.
- e. Pattern and Nature, marking scheme for theory and Practical Examination for Major Specific SEC and VSC courses are included in syllabus.
- f. Question papers will be set in the view of the entire syllabus and preferably covering each unit of the syllabus. Weightage should be provided to each unit as per the hours allotted for teaching.

15. **Standard of Passing:** The standard of passing shall be as per the following table.

	Semester Exam	End Internal Assessment	Course Exam (Total)
Maximum Marks	40	10	50
Minimum Marks required for passing	14	4	18

There shall be a separate head of passing for semester end examination and internal examination. ii) Minimum 18 marks out of 50 and 35 marks out of 100 are required for passing of practical examination of each course. iii) Passing criteria for OJT and Field Project (FP) as per the University guidelines.

Nature of Question paper and scheme of marking:

Theory question paper: Maximum marks -40

Total No. of questions – 3

All questions are compulsory.

Question No.1 is MCQ type (8 Marks).

Question number 2 is long answer type question Carries 16 marks.

Question number 3 is short answer type question carries 16 marks.

(Nature of question paper is provided at the end of syllabus.)

Shivaji University, Kolhapur, Bachelor of Science Credit Framework B. Sc. III-Electronics (To be implemented from June 2026)

Shri Jagad University, Ramnagar, Bachelors of Science Credit Framework B. Sc. III Electronics (16 Cr Implemented from June 2020)														
Level	Sem.	Major (Electronics)		IDC/MDC/OE/GE	VSC/SEC		AEC, VEC, IKS			OJT, FP, CEP, CC, RP			Total Credits	Degree/ Cum. Cr. MEME
		Mandatory	Elective	OE (For Other Faculty)	VSC	SEC	AEC	VEC	IKS	CC	FP/ OJT	RP/ Dissert		
5.5	V	Major-ELE-501 Paper-IX Linear Integrated Circuits (2 Cr)	(Choose One) Major Elective OELEA-503 Paper XI (A) Electronic Communication Systems (2 Cr) or OELEB-503 Paper XI (B) Electronics in Robotics (2 Cr)	Open Elective OEPR-506 AI Tools and Google Workspace Paper-V (2 Cr)	PRELEVSC - 507 Vocational Skill Course Practical Paper-II Raspberry Pi Based Embedded Systems and Applications (2 Cr) (Major specific)	AEC III (2 Cr) (English)	--	--	--	--	ELEOJT-508 (4 Cr)	--	--	UG Degree 132
		Major-ELE-502 Paper-X 8051 Microcontroller Interfacing and Applications (2 Cr)												
		Major-PRELE-504 Practical Paper-V (a)(2 Cr) Paper-V (b)(2 Cr)	Choose One Major Elective PRELEA-505 Practical Paper-VI (2 Cr) or PRELEB-505 Practical Paper-VI (2 Cr)											
	Credits	4(T)+4(P) =8	2(T)+2(P) =4	2 (P) =2	2(P)=2	--	2(T)=2	--	--	--	4	--	22	
	VI	Major-ELE-601 Paper-XII Industrial Electronics (2 Cr)	Choose One Major Elective OELEA-603 Paper XIV (A) Optoelectronics and IoT (2 Cr) OELEB-603 Paper XIV (B) Industrial Automation and PLC Programming (2 Cr)	---	PRELEVSC-606 Vocational Skill Course Practical Paper-III Electronic Product Design and Entrepreneurship (2 Cr) (Major specific)	SEC ELESEC-607 Solar Power Technology Paper-III (2 Cr)	AEC-IV (2 Cr) (English)	--	ELEIKS-608 The Evolution of Indian Electronics Ecosystem (Major Specific)(2Cr)	--	ELEFP-609 (2 Cr)	--	--	
Major-ELE-602 Paper-XIII Advanced Microcontroller Architecture- PIC (2 Cr)														
Major-PRELE-604 Practical Paper-VI (a) (2 Cr) Paper-VI (b) (2 Cr)		(Choose One) Major Elective PRELEA-605 Practical Paper-VIII (2 Cr) or PRELEB-605 Practical Paper-VIII (2 Cr)												
Credits		4(T)+4(P) =8	2(T)+2(P) =4	--	2(P)=2	2(P)=2	2(T)=2	--	2(T)=2	--	2	--	22	
Total Credits		16	8	2	4	2	4	--	2	--	6+	--	44	
Exit Option: Exit Option:4 credits NSQF/Internship/Skill courses														

Structure of B. Sc. III Electronics

B.Sc.-III (NEP-2.0) SEMESTER V

Sr.No.	Particulars	Title of Paper
1	Mandatory Theory	ELE-501 Paper -IX, Linear Integrated Circuits (2 credits, 30 Hours)
2		ELE-502 Paper -X, 8051 Microcontroller Interfacing and Applications (2 credits, 30 Hours)
3	Elective Theory	OELEA-503 Paper XI (A) Electronic Communication Systems OR OELEB-503 Paper XI (B) Electronics in Robotics (2 credits, 30 Hours)
4	Mandatory Practical	PRELE-504 Practical- Paper- V (a)(2 Cr)
5	Mandatory Practical	PRELE-504 Practical- Paper V (b)(2 Cr)
6	Elective Practical	PRELEA-505 Practical Paper-VI (2 Cr) OR PRELEB-505, Practical Paper-VI (2 Cr)
7	OE (Basket)	ELEOEPR-506 Practical Paper-V AI Tools and Google Workspace
8	VSC Major Specific	PRELEVSC-507 Vocational Skill Course Practical Paper-II Raspberry Pi Based Embedded Systems and Applications (2 credits, 60 Hours)
9	OJT Major Specific	ELEOJT-508 (4 credits, 120 Hours)

Shivaji University,
Kolhapur B.Sc. Part- III
Electronics
NEP2.0 (June 2026 Onwards)
Semester- V Paper- IX
Major-ELE-501 Paper -IX: Linear Integrated Circuits
Credits: 02 Hours: 30

Course Outcomes	
After successful completion of this course, the students will be able to :	
CO1	Understand basics of Integrated Circuit Fabrication Techniques.
CO2	Understand basics of differential and operational amplifier.
CO3	Understand basics of operational amplifier building block.
CO4	Understand the applications of the Operational amplifier and PLL

Unit	Contents	Hours Allotted
1.	Unit – 1: Integrated Circuit Fabrication Introduction , History of semiconductor devices, Moore’s Law, advantages of IC’s, classifications of IC’s, IC chip size and circuit complexity, fundamental of monolithic IC technology, Basic Planer Process : silicon wafer preparation, epitaxial growth, oxidation, photolithography, diffusion and ion implantation, isolation technique, metallization and assembly process and packaging, fabrication of monolithic IC, Comparison of thin and thick film technology	07
2.	Introduction of Operational Amplifier Emitter coupled differential amplifier with its operation, characteristics and parameters (I/O impedances, common mode and differential mode gain, CMRR) Dual input and dual output configuration of differential amplifier. Method to improve CMRR (constant current bias and current mirror bias) Introduction to op-amp, block diagram of op-amp, op-amp ideal characteristics, offset balancing technique of op-amp, drift parameters of op-amp, study of IC741 and comparative study of IC’s LM324, LM308, LF356.	07
3.	Applications of Operational Amplifier- I Virtual ground concept, Op-amp as inverting and non- inverting amplifier, summing amplifier (adder and subtractor), V to I and I to V converter, voltage follower, Instrumentation amplifier, Differentiator and integrator, log and antilog amplifier. Op-amp as comparator, regenerative comparator (Schmitt trigger), sine wave oscillators (phase shift and Wien -bridge), Triangular wave generator, square and pulse generator. Peak detector, clipping and clamping circuits, Astable multivibrator	08
4	Applications of Operational Amplifier- II and PLL Op-amp as precision converter, precision rectifier. Advantage of active filters over passive filters. study of filter response (Butterworth, Chebyshev), order of filter, Different types of active filters. Study and design of low pass, high pass, band pass, band stop filters (1 st order) using op-amp, Theory of VCO, Loop filters, Block diagram of PLL, Calculation of Capture range, Lock range, Frequency Multiplication, FSK and FM demodulation, Frequency Synthesizer, Use of IC 565, Frequency Generator using IC 8038.	08

Reference Books:

- 1 Integrated Electronics - Millman-Halkias (MGH)
- 2 Op-Amps and Linear circuits - Ramakant Gaikwad (PHI)
- 3 Operational Amplifiers and Linear ICs - Caughlin and Driscoll (PHI)
- 4 Operational Amplifier with Linear Integrated Circuit – W. D. Stanley (CBS Publications)
- 5 Linear Integrated circuit - D Roy Choudhari, Shail Jain, (Wiley Eastern Ltd)
- 6 Micro electronics Circuits - Rashid (PWS publication)
- 7 Integrated circuit (New Edition) – K.R.Botkar
- 8 Op-Amp - G. B. Clayton, Butterworth Publication
- 9 Design with Operational Amplifiers and Analog ICs - Franco (Mc Graw Hill,2000)

Shivaji University,
Kolhapur B.Sc. Part- III
Electronics
NEP2.0 (June 2026 Onwards)
Semester- V Paper- X
Major-ELE-502 Paper -X: 8051 Microcontroller Interfacing and Applications
Credits: 02 Hours: 30

Course Outcomes	
After successful completion of this course, the students will be able to:	
CO1	Understand the basics of 8051 programming in C
CO2	Understand the serial communication facility in 8051
CO3	Understand the real world interfacing of 8051 microcontrollers.
CO4	Understand a different applications of 8051 microcontrollers.

Unit	Contents	Hours Allotted
1.	8051 Programming in C Software development tools: text editor, assembler/compiler, simulator, IDEs, high level language simulator, Advantages and disadvantages Program in 8051-C & Assembly Language. Data types and time delay in 8051-C, I/O programming in 8051-C, Accessing SFR addresses in 8051- C, Logical operation in 8051 C. Data conversion programs in 8051 C. Accessing code ROM space in 8051 C, programming for Time delay generation(using timer), external interrupts (Level and edge triggering).	08
2.	Serial communication in 8051. Serial Port : Serial port of 8051, RS-232 standard and IC MAX–232, Concept of Baud rate, Baud rate in 8051, Baud rate doubling using crystal frequency and PCON register, SBUF, SCON registers, various modes of serial port, Importance of TI and RI flags, Interfacing of MAX232 to 8051, programming for data transmission and reception in mode–1 in C using TXD, RXD and port pin.	07
3.	Real World interfacing of 8051 Hardware development tools(concept): development boards, device programmer, in- circuit debugger, in-circuit emulators, Interfacing LCD, solenoid switch, opto-coupler, stepper motor, servo Motor, DAC0808 and ADC0804. Speed Control of DC motor by PWM technique, external memory interfacing with 8051 .	07
4.	Applications of 8051 i).Digital Voltmeter ii) Water level controller iii)Traffic Light controller iv) speed measurement of motor v) Gate Emulator(Logic Gate study using microcontroller) vi) Temperature monitoring using LM35, ADC0804, LCD vii) automatic basin control (using IR and solenoid switch) viii) motion detection system using PIR sensor ix)Automatic Street light control System	08

Reference Books:

1. The 8051 Microcontroller -K. J. Ayala, (Penram International)
2. The 8051 Microcontroller and Embedded Systems, M. A. Mazadi,J. G. Mazadi, Pearson Education, Asia
3. Advanced PIC microcontroller projects in C from USB to ZigBee with the PIC18F series Dogan Ibrahim, Newnes
4. PIC microcontroller and Embedded Systems using assembly and C for PIC 18,Muhammad Ali Mazadi et al. Pearson Education publication,1st Edition, Fourth Impression 2011(Indian Edition).
5. C and the 8051: Programming and Multitasking, Schultz, P T R Prentice-Hall, Inc. Embedded C, Michael J. Pont

Shivaji University,
Kolhapur B.Sc. Part- III
Electronics
NEP2.0 (June 2026 Onwards)
Elective-OELEA-503 Paper XI: Electronic Communication Systems
Credits: 2 Hours: 30

Course Objectives:

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

CO1: Understand the basic knowledge of satellite and mobile communication systems.

CO2: Understand the basic principle, working of RADAR and computer networking.

CO3: Understand the different communication antennas characteristics and applications.

CO4: Understand radio wave propagation mechanisms and related parameters.

Unit	Contents	Hours Allotted
1	Communication Systems – I Mobile Communication: Cellular concept, concept of cell sectoring and splitting, Hand-off process, SIM number, IMEI number and handover, Working of GSM, idea of FDMA, TDMA & CDMA technologies, 2G, 3G, 4G and 5G concepts (qualitative only), block diagram of mobile phone handset, GPS navigation system (qualitative idea only) Satellite Communication: Introduction, Types of Satellite (LEO, GEO, HEO and MEO), characteristics/features of geosynchronous satellite, Satellite communication System : transponder, Satellite visibility, Uplink & Downlink, frequency bands, Earth station block diagram.	08
2	Communication Systems – II RADAR: Basic Concept, radar trigonometry, radar systems, continues wave doppler radar, radar applications Computer Networking : Concept of Networking, features of communication networking, common networks : LAN, WAN and MAN, Network Topology, Computer Network Components :Modem, nodes, Hub, Switch, NIC, Server, Clint, router, firewall, communication media, Network software : NOS, Protocols, network services, IP: concept, types,	07
3	Antenna Fundamental A] Introduction, Need, Types, Radiation Mechanism, Scope of antenna design. B] Antenna Parameters- Beam widths, Beam Area, Bandwidth, Percentage bandwidth , Radiation Intensity, VSWR, Beam Efficiency, Directivity, Gain, Impedance matching, Antenna Apertures, Aperture Efficiency, Effective Height. C] Radiation pattern: Introduction, Lobe formation, types of radiation pattern D]Types of antennas- Monopole, Dipole, Folded dipole, Loop antenna, Yagi-Uda, dish antennas, horn, Patch, Slot, Spiral, Fractal antennas (Qualitative Study: construction, advantages and applications), Smart antenna concept.	09
4	Radio Wave Propagation Introduction to wave propagation, Structure of atmosphere, Ground wave propagation, Space wave propagation, Sky wave propagation, LOS Structure of ionosphere (basic idea), Expression for: Critical frequency, Maximum Usable Frequency (MUF), Skip distance, multi-hop propagation.	06

Reference Books:

1. Electronic Communication Systems Fundamentals through advanced, Wayne Tomasi
Pearson Education Press
2. Wireless communications, Andrea Goldsmith, Cambridge University Press
3. Modern Wireless Communication, Haykin S. and Moher M., Pearson Antenna Theory:
Analysis and Design – C. A. Balanis
4. Antenna and Wave Propagation, John D Kraus, Marhefka, A. S. Khan Tata McGraw Hill
5. Antenna Theory and Design – W. L. Stutzman & G. A. Thiele
6. Antenna & Wave Propagation – K. D. Prasad
7. Computer Network : B. B. Agarwal, S. P. Tayal, University Science Press

Shivaji University, Kolhapur

B.Sc. Part- III Electronics
NEP2.0 (June 2026 Onwards)

Semester- V

Elective-OELEB-503 Paper XI (B): Electronics in Robotics

Credits: 02 Hours 30

Course Outcomes

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

CO1	Understand the basics of mechatronics and MEMS.
CO2	Understand fundamentals of Robotics systems.
CO3	Understand the sensors and actuators used in Robots
CO4	Understand basics applications robot.

Unit	Contents	Hours Allotted
1.	Fundamentals of Mechatronics Mechatronics System: definition, advantages, disadvantages, features, applications, role of engineering discipline in mechatronics, components of mechatronics, mechatronic design elements, traditional and mechanical design, MEMS: Introduction, description, advantages and application, Procedure for designing a mechatronic system, manufacturing MEMS, MEMS microsensor – accelerometer and humidity Examples of mechatronic system,	08
2.	Fundamentals of Robotics Robotics: Brief history, Definition and advantages of robotics, laws of robotics, Robot: definition, advantages, disadvantages, types of industrial Robot, applications, functions, basic motions of robot, microprocessor based robotic system, robot selection, Robot vs Robotics Robotic Systems: Block diagram robotic system(base, manipulator arm, end effector, actuators and transmission, controllers, sensors), general structure of advance robot, Robot classifications(names only), robot control, board and general classification, Types of end effectors: mechanical, magnetic and adhesive grippers, tools, Industrial Applications of vision control robotic system	08
3	Sensors and Actuators in Robots Sensors applications in Robotics : Classifications : Internal, external, tactile, non-tactile, statues, environmental sensor tactile, Tactile, position and displacement, proximity sensors: contact and Non-contact Robotic drives: electric, hydraulic, pneumatic, comparison of robot drive system. Electrical Actuators : Solenoids, DC motors: brushless and permanent magnet DC motor, stepper motors (VR, PM and hybrid), stepper motor specifications, Stepper Motor driver using ULN2008, DC Motor driver ICs L293D, L298, Study of BLDC Motor Driver IC DRV10983, servomotor and its positioning control, mechanical aspects of motor selection Robot Control systems: non servo control and servo control, Types of controller used in Robotics Concept of bearing, Gear and Gear Ratio	08

4	Robot Applications Digital camera and autofocus, the engine management system, the automatic control of the water, shaft speed control, copy machine, solar tracker, satellite tracker, line following robot, firefighting robot, pick and place robot (Block diagram and explanation)	06
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Reference Books

1. Mechatronics Electronic Control Systems in Mechanical and Electrical Engineering- WBolton Pearson Publication
2. A text book of Mechatronics : R. K. Rajput (S. Chand)
3. K.S.Fu, R.CGonzalez and C.S.G. Lee, Robotics control, Sensing, Vision and intelligence", McGraw 3 Hill,1994.
4. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006
5. Deb, S.R. "Robotics Technology and Flexible Automation", Tata McGraw Hill, 1994.
6. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence",McGraw Hill, 1987. <https://www.robots.com/applications>.

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Electronics Semester –V
Major-PRELE-504 Practical Paper-V (a)
Credits: 2

Course Outcomes

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

CO1: Demonstrate different applications circuits of the Operational amplifier.

CO2: Demonstrate different applications and interfacing circuits of the 8051

Practicals:

1. Instrumentation amplifier using OP-AMP
2. Precision rectifier using OP-AMP
3. Log amplifier using OP-AMP
4. Function generator using IC8038
5. study of active filter : band pass/low pass
6. Clipping and clamping circuit using OP-AMP
7. Schmitt trigger using OP-AMP
8. OPAMP Parameters
9. Voltage follower using OPAMP
10. Differential amplifier
11. OPAMP as a summing amplifier
12. OPAMP as an Inverting and non-inverting amplifier
13. Wein Bridge Oscillator using OPAMP
14. Phase shift Oscillator using OPAMP
15. Astable Multivibrator using OPAMP

(Minimum 12 Experiments)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Electronics Semester –V
Major-PRELE-504 Practical Paper-V (b)
Credits: 2

1. Logical operations using 8051-C
2. Arithmetic operations using 8051-C
3. DC motor interfacing with 8051
4. Stepper Motor interfacing with 8051.
5. DAC0808 interfacing to 8051
6. ADC0804 interfacing to 8051
7. Relay interfacing with 8051 using opto-coupler
8. LCD interfacing with 8051
9. Development of Gate emulator system using 8051
10. MAX232 interfacing with 8051
11. Servo motor interfacing with 8051
12. Solenoid water valve interfacing with 8051
13. Time delay generation in 8051-C
14. Data Conversion Program in 8051-C
15. Motion detection system using 8051

(Minimum 12 Experiments)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Electronics Semester –V

Elective-PRELEA-505 Practical Paper-VI
Credits: 2 Hours: 4 Hours/Week

Course Outcomes

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

CO1- Understand the working of various types of antennas.

CO2- Understand the working various communication systems.

1. Identification of various antennas (Monopole, Dipole, Yagi, Patch, Dish, Wi-Fi)
2. Study of simple dipole $\lambda/2$ antenna (Antenna Trainer/simulation)
3. Study of simple dipole $\lambda/4$ antenna (Antenna Trainer/simulation)
4. Study of Folded dipole $\lambda/2$ antenna (Antenna Trainer/simulation)
5. Study of Yagi- Uda -5 element simple dipole antenna (Antenna Trainer/simulation)
6. Study of Yagi- Uda -3 element simple dipole antenna (Antenna Trainer/simulation)
7. Study of RF Transreceiver Module
8. Study of parabolic Dish antenna and its feeding techniques
9. Adjustment and alignment of DTH antenna
10. Study of Mobile Communication Architecture (GSM based)
11. Study of the Arduino/Raspberry Pi/Microcontroller based RADAR System
12. Study of Network Tools and Devices :Router, HUB, Switch, Modem, NIC,etc
13. Wireless Router Configuration (Wi-Fi SSID setup, security mode, IP observation)
14. Basic IP Address Configuration and Ping Testing
15. Prepare and configure a LAN of minimum 3 computers using HUB/switch for sharing resources

(Minimum 12 Experiments)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Electronics Semester –V
Elective-PRELEB-505 Practical Paper-VI
Credits: 2 Hours: 4 Hours/Week

List of Practicals

Course Outcomes

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

CO1: Understand the various applications of mechatronics and Robotics

CO2: Understand the use of sensors and actuators for robot applications

List of Practical's

1. Rain sensor wiper
2. Car Engine temperature management System
3. Stepper Motor Position Control
4. To study Motion of robot at different targets.
5. To Study pick and place robot.
6. To study Carton filling robot application
7. To study Spray painting robot application.
8. To study Welding robot application.
9. To study PCB drilling robot application.
10. Servo Motor Angle Control
11. Line following robot
12. Fire fighting robot
13. Obstacle avoidance robot with ultrasonic sensor
14. Robotic arm using servo motors
15. Positioning control using Hall effect sensors

(Minimum 12 Experiments)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Electronics Semester –V
Open Elective-ELEOEPR-506 Practical Paper V
AI TOOLS AND GOOGLE WORKSPACE
Credits: 2 Hours: 4 Hours/Week

Course Outcomes

After completion of this course, the student will be able to

CO1: Students will be able to understand step-by-step exercises on Google Workspace tools including Drive, Docs, Sheets, Slides, Gmail, Meet, Calendar, Forms, and Classroom.

CO2: Students will be proficient in using AI tools for academic, administrative, and collaborative tasks in higher education and research environments.

Practical's

1. To perform file upload, folder creation, sharing permissions, and version control in **Google Drive**.
2. To create, format, Insert images, hyperlinks, citations and collaborate on a document using **Google Docs**.
3. To Create spreadsheets, apply formulas (SUM, AVERAGE), charts, and data validation in **Google Sheets**.
4. To design a presentation with themes, animations, and transitions in **Google Slides**.
5. To compose professional emails, apply labels, filters, and attachments in **Gmail**.
6. To create and manage academic events, reminders, and invitations in **Google Calendar**.
7. To design surveys and quizzes, and analyze responses using **Google Forms**.
8. To create a virtual classroom, distribute assignments, and provide feedback in **Google Classroom**.
9. To arrange online meeting by proper scheduling in **Google Meet**
10. To study conversational AI using **ChatGPT**.
11. To study AI based presentation Creation (**Canva / Gama**).
12. To study Text to Image Generation Using Artificial Intelligence tools **Bing Image Creator or DALL·E**.
13. To study AI based resume and cover letter generation (**Canva/ ChatGPT**).
14. To study AI assisted short story generation (**Story Teller / sudowrite**).
15. To study AI based song lyrics creation (**Suno AI**).
16. To create an emotion recognition model using **Teachable Machine**.
17. To create an interactive story using **Scratch**.
- 18.

(Minimum 12 Experiments)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Electronics Semester –V
PRELEVSC-507 Vocational Skill Course Practical Paper-II
Credits: 2 Hours: 4 Hours/Week
Raspberry Pi Based Embedded Systems and Applications

Course Outcomes

After completion of this course, the student will be able to

CO1: Understand the fundamentals of Raspberry Pi - single board system and its applications

CO2: Demonstrate different interfacing circuits of the Raspberry Pi

Sr. No.	Title of Experiment
1.	Introduction to Raspberry Pi Definition and concept of Single Board Systems (SBS), 1) Overview of popular single board systems: • Arduino (Microcontroller-based system) • Raspberry Pi (Single-board computer) 2) Comparison of SBS with traditional microcontroller and microprocessor-based systems
2	Interfacing LEDs with Raspberry Pi using GPIO pins
3	Interfacing a switch to Raspberry Pi GPIO pins and displaying the switch status using an LED
4	Interfacing an LCD display with Raspberry Pi
5	Interfacing a temperature sensor LM35 with Raspberry Pi for temperature measurement
6	Interfacing a photo sensor (LDR) with Raspberry Pi to measure light intensity
7	Interfacing an ultrasonic sensor with Raspberry Pi for distance measurement
8	Interfacing a PIR sensor with Raspberry Pi for motion detection
9	Interfacing Pi Camera with Raspberry Pi
10	Speed control of DC motor using Raspberry Pi
11	Interfacing stepper motor with Raspberry Pi
12	Interfacing servo motor with Raspberry Pi
13	Sending sensor data to a cloud server using MQTT or HTTP protocol
14	Voice Command based System for LED ON/OFF using AI
15	Voice Command based System for home automation using AI

ELEOJT- 508 (4 Credits, 120 Hours)

See Annexure-I

Structure of B. Sc. III Electronics

B.Sc.-III (NEP-2.0) SEMESTER VI

Sr. No.	Particulars	Title of Paper
1	Mandatory Theory	ELE-601 Paper -XII, Industrial Electronics (2 credits, 30 Hours)
2		ELE-602 Paper -XIII, Advanced Microcontroller Architecture-PIC (2 credits, 30 Hours)
3	Elective Theory	OELEA-603 Paper XIV (A) Optoelectronics and IoT (2 Cr) OR OELEB-603 Paper XI (B) Industrial Automation and PLC Programming (2 credits, 30 Hours)
4	Mandatory Practical	PRELE-604 Practical Paper-VI (a) (2 credits)
5	Mandatory Practical	PRELE-604 Practical Paper-VI (b) (2 credits)
6	Elective Practical	PRELEA-605 Practical Paper-VIII (2 Cr) OR PRELEB-605 Practical Paper-VIII (2 Cr)
7	VSC Major Specific	PRELEVSC-606 Vocational Skill Course Practical Paper-III Electronic Product Design and Entrepreneurship (2 credits, 60 Hours)
8	SEC (BASKET)	ELESEC-607 Paper-III Solar Power Technology (2 credits, 60 Hours)
9	IKS Major Specific	ELEIKS-608 The Evolution of Indian Electronics Ecosystem (2 credits, 30 Hours)
10	FP Major Specific	ELEFP-609 (2 credits, 60 Hours)

Shivaji University, Kolhapur
B.Sc. Part- III Electronics
NEP2.0 (June 2026 Onwards)
Semester- VI Paper- XII
Major-ELE-601 Paper -XII: Industrial Electronics
Credits: 02 Hours: 30

Course Outcomes

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

CO1	Understand construction, working and applications of semiconductor power devices.
CO2	Understand structure, characteristics operation of IGBT and thyristors.
CO3	Understand basics of uncontrolled and controlled rectifiers.
CO4	Understand applications of power devices.

Unit	Contents	Hour Allotted
1	Unit 1 :-Power Devices Power Electronics : Concept, applications, systems, types, advantages and disadvantages of power electronic converters, Power Devices : Features, Construction, working/operation and static characteristics : Diode, Transistors (BJT, MOSFET and IGBT), TRIAC, DIAC and Thyristers /SCR, two transistors analogy of SCR, diode types	09
2	Unit 2 :- Power Circuits SCRs : turn on Methods, turn off process, Concept of firing angle and conduction angle, ratings, protection circuits (di/dt and dv/dt), advantages and disadvantages, SCRs applications (Single Phase) : Switch (Static), DC Motor Speed Control, DC timer, AC timer, half wave controlled rectifier with R and RL load (analysis only with R load), concept of freewheeling diode, semi-converter (symmetrical) with R load, full Converter (Bridge) with R load, Single phase bidirectional controller with resistive load AC Phase control using TRIAC and DIAC,	09
3.	Unit 3 :- Applications of Power Devices Uncontrolled rectifiers: Basic and three phase supply, phase and line voltage waveforms, three phase half wave rectifier with resistive load, three phase full wave rectifier with resistive load, Controlled Rectifiers: half, semi-converter and full convertor, with resistive load.	09

	Concept of SMPS, UPS (On line and Off line), Electronic Ballast and Power factor correction. Principle of induction and dielectric heating.	
4	UNIT 4: Electric Vehicle Systems Block diagram of Electric Vehicle (EV), Advantages of EV, Comparative study of EV and Hybrid Vehicles, Types of EVs: Battery Electric Vehicle (BEV), Plug in Hybrid Electric Vehicle (PHEV), Hybrid Electric Vehicle (HEV), Fuel Cell Vehicles, Electric Vehicle Batteries Charging EV: Tickle charge, charging at home, Charging power station, High power stations	09

Reference Books

1. Power Electronics – M.H. Rashid (PHI)
2. Power Electronics- Jamil Asghar(PHI)
3. Power Electronics-P.C. Sen
4. Power Electronics-Samir K. Datta(PHI)
5. Thyristor Engineering – M.S.Berde, Khanna Publications
6. Power Electronics Principles and Applications-S. Biswas(Dhanapat Rai Publications)
7. Power Electronics- I by J.S. Katre(Tech-Max)
8. Power Electronics- Dr. P.S. Bhimbhra (Khanna publications)
9. Power Electronics- by Jalnekar(Technical Publications Pune)
10. Electronics in Industry- G.M. Chute and R.D. Chute(Mc-Graw Hill)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III)
Electronics Semester –VI
Major-ELE-602 Paper -XIII, Advanced Microcontroller Architecture-PIC
Credits: 2 Hours: 30

Course Outcomes	
After successful completion of this course, the students will be able to :	
CO1	Understand basics of PIC families..
CO2	Understand the instruction set as well as programming of PIC18 in assembly and C .
CO3	Understand Timer/Counter and ADC facilities in PIC18.
CO4	Understand serial communication and different type of interrupts facilities in PIC18

Unit	Contents	Hours Allotted
1	Introduction –Introduction, Features of PIC microcontrollers: Watch Dog Timer (WDT), Brownout detector, ISP, I2C bus, SPI bus. analog comparator, low power devices, RTC, sleep mode, Harvard vs. Von Neumann architecture (#57-58), CISC and RISC(62-65), Comparison of PIC12XX, PIC16XX, PIC18XX, PIC24XX and PIC32XX PIC families, WREG register(#18), PIC file register, SFRs, GPR, GP RAM vs EEPROM, File register and access bank in the PIC18(#21-25), PIC status register(#35-36), Pin diagram (18F458) (\$ 2, 10-15)	07
2	Instruction Set and Programming of PIC18- Instruction set (#660-697), Addressing modes, I/O ports programming, I/O bit manipulation programming, program for square wave generation at port pin and port, reading and monitoring single bit (#109-129), BCD to ASCII, ASCII to BCD conversion (#162 to 164), Minimum connection (Clock and reset circuit)(#280), stack and stack pointer in PIC18 (#88-90), ROM width in the PIC18(#55-56), bank switching(#197-203), pipelining, instruction cycle time, branch penalty, loop inside a loop delay (#95-102)	08
3.	Facilities in PIC18: Programming timers 0: T0CON, PIR1 register, programming timer 0 in 16 bit mode and 8-bit mode in C, delay calculation (Timer count calculation), comparison of T0CON, T1CON, T2CON and T3CON timers of PIC18(#314-359) Interrupts: Interrupt vector table in PIC18, sources of interrupts, INTCON register, interrupts enabling, programming of external hardware interrupts in C, setting interrupt priority (#402-406,417-422,427-428,432-434). Serial communication: serial port programming, SPBRG, TXREG, RCREG, TXSTA, RCSTA register, Interfacing MAX232 to PIC18, programming PIC18 to transfer and receive data serially in C, importance of TXIF and RCIF flag, quadrupling baud rate (#375-387)	08

4	Interfacing PIC-18 Microcontroller- Interfacing PIC microcontroller: LED array, Switches, Solid State Relay, Seven Segment Display, 16x2 LCD display, 4x4 Matrix Keyboard, servo motor, Stepper Motor and DC Motor (Programming in C) ADC programming: features of ADC, programming, ADCON0 , ADCON1 register, conversion time, programming the ADC using polling with C, (#483-492), use of PIC as a digital thermometer (Display on LED)	07
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Reference Books-

1. Muhammad Ali Mazadi et al. "PIC microcontroller and Embedded Systems using assembly and C for PIC 18," Pearson Education publication, 1st Edition, Fourth Impression 2011 (Indian Edition).
2. PIC micro 18C MCU reference manual,
ww1.microchip.com/downloads/en/DeviceDoc/39500a.pdf
3. PIC18FXX8 data sheet, ww1.microchip.com/downloads/en/devicedoc/41159d.pdf
4. Peatman, John B. Design with PIC microcontrollers. Simon & Schuster Trade, 1997.

Shivaji University, Kolhapur
B.Sc. Part- III Electronics
NEP2.0 (June 2026 Onwards)
Semester- VI Paper- XIV

Elective-OELEA-603 Paper XIV (A): Optoelectronics and IoT
Credits: 02 Hours: 30

Course Outcomes

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

CO1	Understand working of LASER diode, LED, Photodiodes, and Phototransistors.
CO2	Understand OFC communication and construction - working of different types of fibers.
CO3	Understand different types of losses in optical fibers.
CO4	Understand the concept, working and applications of IoT.

Unit	Contents	Hours Allotted
1.	Optical Fiber Communication System and Photonic Devices Principle of optical communication, Total internal reflection, Basic structure of optical fiber (core, cladding, jacket), Types of optical fibers: step index, graded index, single mode, Block diagram of optical fiber communication system, Optical fiber transmitter and receiver, Optical sources: LASER: basic concept, injection laser diode (ILD), characteristics, LED: structure, power, efficiency, characteristics, Optical detectors: p-n photodiode, p-i-n photodiode, Avalanche photodiode (APD), Optical receiver operation, Advantages and applications of optical fiber communication	10
2.	Transmission Characteristics of Optical Fibers Signal degradation in optical fibers, Attenuation in optical fiber, Absorption losses: intrinsic and extrinsic, Scattering losses: linear and nonlinear, Bending losses: macrobending and microbending, Joint and connector losses, Distortion in optical waveguides, Dispersion in optical fibers: Modal dispersion, Chromatic dispersion, Waveguide dispersion, Pulse broadening and its effect on system performance, Measurement of attenuation and dispersion	8
3.	Introduction to Internet of Things (IoT) Definition and concept of IoT, Evolution of IoT, IoT system architecture (device, gateway, cloud), Components of IoT system: Sensors and actuators, Embedded controllers, Communication modules, IoT communication technologies: Wi-Fi, Bluetooth, GSM, LoRa (introductory), IoT protocols (overview): HTTP, MQTT,	6
4.	IoT Sensors, Communication and Applications Sensors used in IoT, Signal conditioning and data acquisition, IoT data communication basics, Cloud platforms and mobile interface (introductory), Data visualization and alerts, IoT based monitoring and control systems, Advantages and challenges of IoT, Case studies of IoT applications, Applications of IoT: Smart home, Smart agriculture, Healthcare, Industrial automation	6

Reference Books

1. Optical Fiber Communication – G. Keiser - MGH
2. Fundamentals of Optics – Jenkins & White - MGH
3. Optical Fiber Communication – J.M. Senior - PHI
4. Optical Communication – Gagliardi & Karp – Wiley

5. Semiconductor Optoelectronics Devices-Bhattacharya &Pallab - Pearson Education.
6. Optoelectronics an Introduction to Materials and Devices - Singh, &Jasprit - McGraw-Hill
7. Fiber Optics & Optoelectronics - Khare, R.P. - Oxford Univ. Press
8. Text Book of Optical Fiber Communication & Its Applications- Gupta & S.C. Pren

Shivaji University, Kolhapur
B.Sc. Part- III Electronics
NEP2.0 (June 2026 Onwards)
Semester- VI Paper- XIV
Elective-OELEB-603 Paper XIV (B) Industrial Automation and
PLC Programming
Credits: 02 Hours: 30

Course Outcomes	
After successful completion of this course, the students will be able to :	
CO1	Understand basics of control system.
CO2	Understand components of control system.
CO3	Understand programming logic controller (PLC) basics.
CO4	Understand ladder programming basics.

Unit	Contents	Hours Allotted
1.	Introduction to Control System Basic building of automation systems, open loop control system, closed loop control system, control system terminology, manually controlled closed loop systems, automatic controlled closed loop systems, comparison closed-loop system and open-loop control, feed-forward control, cascade control, ratio control system, adaptive control system, classification of control system: Discrete Control System: ON-OFF controller, multi-position control systems, PWM control continuous control systems: proportional control, PI controller, PD controller and PID control.	07
2.	Components of Control System Op-amp as a zero-crossing detector, non-inverting comparator, inverting comparator, Two position control using op-amp, proportional controller, integral controller using Op-amp, derivative controller, PI controller, PID controller. Basic components: fuse, pushbutton, selector switches, limit switches, indicators, relay, time delay relays, proximity sensors inductive, hall effect and optical, optical and magnetic encoders. Final controlling elements: pneumatic actuation, pneumatic cylinders, single actuating cylinders, double actuating cylinders, double rod cylinders, Tenden cylinders, multi-position cylinders, rotary cylinders, telescope cylinders. Electric actuation: relay, reed relay, solenoid, Thyristor, Triac, DC motor, AC motor, servo motors, stepper motor, control valves.	08
3.	Introduction to PLC Programmable logic controller (PLC) basics: Definition, overview of PLC systems, block diagram of PLC, input/output modules, power supplies, isolators, features like scan time, system scale, user interface. Modular PLC and Redundant PLC and Applications, Communication protocols: RS485, Profibus, Modbus, HART protocol, EtherCAT. PLC installation and panel	08
	wiring diagrams. Advance Control Algorithm: direct digital control, Distributed control system, DCS components/block diagram, system architecture, distributed vs centralized control systems, advantages of distributed control system, SCADA, adaptive control system.	

4.	Ladder Programming Basics General PLC programming procedures, Ladder diagrams instructions: special functions, data transfer and manipulation instructions, flow control operations, Boolean memories, data transfer operations, arithmetic and logical operations, flow control operations. Register basics, timer functions, counter functions. Ladder Programming: Programs for Boolean logic and flip-flops, single shot (monostable), holding contacts, counters, timers, flasher. Application Program: Bottle filling plant, automatic color mixing tank, timed sequencer washing machine control, automatic car parking system. Automatic traffic light controller.	07
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Reference Books

1. Control System Engineering- I.J. Nagrath and M.Gopal (New Age International Publication 5th Edition 2006)
2. Feedback Control System Principles And Control System R.A.Barapate (Techmax publication 10th edition)
3. Modern Control Engineering-Katsuhiko Ogata (Prentice Hall, 2010)
4. Computer Based Industrial Control- Krishna Kant (PHI Learning 2004)
5. Programmable Logic Control Programming And Applications - John R. Hackworth
6. Frederic D. Hackworth (Pearson Education India forth edition 2008)
7. 6. Introduction To Programmable Logic Controller- Gray and Dunning (2nd edition Thomson Education)

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
Major-PRELE-604 Practical Paper-VI (a)
Credits: 2

Course Outcomes-

After successful completion of this course, the students will be able to-

CO1: Demonstrate different circuits and the applications of the power electronic devices

CO2: Demonstrate different on-chip facility, applications and interfacing circuits of the PIC18

Practicals:

1. Study of SCR/MOSFET/TRIAC characteristics (static)
2. Study of AC Timer
3. Study of DC Timer
4. SCR firing by UJT
5. AC Voltage controller/Light Dimmer Circuit
6. Phase Shift control of SCR
7. Single phase half-wave/full wave controlled rectifier with Resistive load.
8. Battery Charger using SCR.

9. Study of Temperature ON/OFF controller (LM34/LM35/AD590)

10. DC Motor Control

11. To demonstrate SMPS/ UPS

12. Comparative study of different types of EVs

13. Study of EV Charger (Basic)

14. Study of High frequency/ Induction Heating

15. Lithium ion battery bank and BMS wiring

(Minimum 12 experiments)

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
Major-PRELE-604 Practical Paper-VI (b)
Credits: 2

1. Use of MPLAB simulator: Addressing modes
2. Use of MPLAB simulator: I/O port programming (Square wave generation, Toggle port)
3. Programming PIC in timer 0 8-bit mode
4. Programming PIC in timer-0 16-bit mode
5. PIC minimum circuit design and testing on LED
6. Serial communication using PIC
7. Programming of PIC on chip ADC
8. Programming external hardware interrupts in PIC
9. Interfacing Solid State Relay with PIC
10. Interfacing Seven Segment Display with PIC
11. Interfacing 16x2 LCD display with PIC
12. Interfacing 4x4 Matrix Keyboard with PIC
13. Interfacing DC Motor with PIC
14. Interfacing servo motor with PIC
15. Digital thermometer using PIC

(Minimum 12 experiments)

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
Elective-PRELEA-605 Practical Paper-VIII
Credits: 2 Hours: 4 Hours/Week

Practical's

1. Optical fiber bending loss calculation
2. Voice link using optical fiber
3. OFC transmitter and OFC receiver
4. Numerical aperture Calculation
5. LDR characteristics
6. LED/LASER Characteristics
7. Photo transistor/PIN photodiode characteristics
8. IoT using google assistance
9. IoT based Home automation
10. IoT based Motion detection System
11. IoT based Health Monitoring system
12. IoT based greenhouse temperature Monitoring system
13. IoT based GAS leakage/ smoke detection System
14. IoT based Water level Monitoring System
15. IoT based Street Light Monitoring/Control System

(Minimum 12 Experiments)

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
Elective-PRELEB-605 Practical Paper-VIII
Credits: 2 Hours: 4 Hours/Week

Course Outcomes

After completion of this course, the student will be able to

CO1: Understand how to use the simulator software for PLC programming.

CO2: Understand the ladder programming for various applications.

1. Study of PLC Simulator (TriLOGI Software)/ codesys-software/ hardware and implementing Boolean function.
2. Programming with PLC (TriLOGI Software)/ codesys-software/ hardware) for sequential logic RS –FF & D-FF
3. Programming with PLC (TriLOGI Software)/ codesys-software/ hardware) for sequential logic JK-FF & T-FF
4. Study of PLC timers and counters ((TriLOGI Software)/ codesys-software/ hardware)
5. Designing and programming of SCADA using simulation software: batch processing
6. Automatic color mixer
7. Programming PLC for Bottle filling plant
8. Programming for Automatic parking Gate
9. Designing and programming of SCADA: Automatic traffic signal controller
10. Study and implementation of proportional controller
11. Study and implementation of integral controller
12. Study and implementation of derivative controller
13. Study and implementation of PD controller
14. Study and implementation of PI controller
15. Study and implementation of PID controller

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
PRELEVSC-606 Vocational Skill Course Practical Paper-III
Electronic Product Design and Entrepreneurship

Course Outcomes

After completion of this course, the student will be able to

CO1: Understand the key aspects in Electronics production entrepreneurship for system and product development.

CO2: Transforming a concept into marketable product through structural, technical and business oriented skill.

A) Electronics Product:

- 1) DC Power Supply +5V, 5A
- 2) Audio Amplifier
- 3) Digital voltmeter using microcontroller/Arduino/raspberry Pi
- 4) Traffic Control System using microcontroller/Arduino/raspberry Pi
- 5) Liquid Level Control System using microcontroller/Arduino/raspberry Pi
- 6) Temperature Monitoring and Control system
- 7) AC voltage controller using microcontroller/Arduino/raspberry Pi

(Minimum 4 products)

Design the above products with 2 additional products (selected by students after the market needs/survey) by following these steps:

1. Study of market needs and identification of an electronics product idea
2. Preparation of Product Requirement Specification (PRS) for an electronic product
3. Design a block diagram/system architecture for the selected electronic product.
4. Prepare a list of components required for the product development by datasheet analysis.
5. Design a circuit using selected components.
6. Simulation of the designed circuit using any simulation software
7. Test the prototype on a breadboard.
8. Develop Printed Circuit Board (PCB) for the selected electronic product.
9. Assembly of a prototype of an electronic product
10. Fault finding
11. Performance testing/calibration of the developed electronic product
12. Development of firmware/control logic for product operation

13. Testing safety and reliability for electronic products
14. Product packaging and enclosure
15. Preparation of the Bill of Materials (BOM) of the developed product and comparison of the product cost with the existing product.
16. Enlist the product quality and features for sale.
17. Create a PowerPoint presentation of the products.
18. Control procedures and technical documentation

B] SSI (Small Scale Industry) Plan

1. Prepare a small business plan for LED bulb manufacturing/Scrolling Display/ PCB designing service/Electronic repair shop/Electric vehicle/solar installation/AC installation/, etc.
2. Calculate initial investment, raw material cost, expected profit and target customers.
3. Start business by taking important product development steps
4. Sale minimum one product in the market

C] Electronics Business Entrepreneur

Study the success stories of at least three electronics business entrepreneurs. Analyze how they started their own business with their innovation strategies and market expansion.

D] Industrial visit

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
ELESEC-607 Paper-III
Solar Power Technology

Credits: 2 Hours: 4 Hours/Week

Course Outcomes

After completion of this course, the student will be able to

CO1: Understand the concept of solar cells, PV modules and on-grid and off grid systems

CO2: Design the solar powered applications.

List of Practicals-

1. Preparation of PV module datasheet
 2. Introduction to Solar cell
 3. Structure design for ON-Grid solar system
 4. Earthling design for ON-Grid solar system.
 5. PV module selection for various system.
 6. Study of battery management system.
 7. Study of various battery types.
 8. Study of solar dc emergency light.
 9. Study of solar pumping system for agriculture.
 10. Study of solar power bank for mobile.
 11. Design of Strings/ Arrays of PV modules
 12. AC distribution box DC distribution box and inverter installation
 13. Study of Charge controller
 14. Study of solar radiation and measurement
 15. Solar tracking system
 16. Solar Street lights
 17. Design and development of DC solar lighting system.
 18. Installation of complete ON-Grid Solar system
 19. Installation of complete OFF-Grid Solar system
 20. Installation of complete Hybrid Solar system
 21. Design and development of Solar Lantern.
 22. Testing and Fault finding of solar system
- (Minimum 12 Experiments)

Shivaji University, Kolhapur
B.Sc. (Part III) Electronics Semester –VI
ELEIKS-608 The Evolution of Indian Electronics Ecosystem
Credits: 02 Hours: 30

Course Outcomes	
After successful completion of this course, the students will be able to :	
CO1	Analyze the Evolution of Indian Electronics
CO2	Evaluate Scientific Contributions
CO3	Identify Institutional Infrastructure
CO4	Appraise National Strategic Missions

Unit	Contents	Hours Allotted
1.	Growth and Progress of Electronics industry in India An Introduction to growth and the progress of electronics sector India, history of trades in consumer electronics, regulations related to the electronics goods. Establishment of all India Radio, Doordarshan, Akashwani computer, television, color television, Prasar Bharati corporation DD. The growth of various segments of the electronics industry in telecommunications, consumer electronics, computer hardware and software.	08
2.	Indian scientist - Biography of Sir JC Bose, invention of radio wave detector, patent, invention in wireless communication. Biography of Dr.C.V. Raman, Ramn effect and its application in Raman spectroscopy. Biography of Dr. V.P. Bhatkar, development of param supercomputer. Dr S. G. Pitroda biography. Development Centre for Development of Telematics. India Semiconductor Mission	08
3.	Electronics research institution in India Government of India research laboratories Bharat Electronics, Defence research and development organization, semiconductor Laboratory Chandigarh, C-DAC, Central Electronics Engineering Research Institute (CEERI), Pilani. Indian space research organization. National informatics centre. Ministry of Electronics & Information Technology, Government of India	08
4.	History of Indian Satellites Evolution of Indian Space Research, Early Phase of Indian Space Research (1960–1970), Development Phase of Indian Space Research (1970–1980), Expansion Phase of Indian Space Research (1980–1990), Modernization Phase of Indian Space Research (1990–2000), Advanced Space Research Phase (2000–2010), Advanced and Global Phase of Indian Space Research (After 2010)	06

ELEFP-609 (2 Credits)
See Annexure II

Annexure I

B. Sc. III, Sem. V

**OJT (On Job Training) (4
Credits)**

All students should complete the OJT before the start of SEM VI (Follow the timeline provided by SUK). For details, follow the Shivaji University guidelines.

Refer: SU/AM/240 dated 22/04/2024

After completion of OJT, the student should submit a detailed report. It should be evaluated by an expert committee.

Marks Distribution of OJT:

Component	Evaluator	Weightage	Marks
Progressive Assessment	Industry Supervisor	30%	30
OJT Report	Academic Mentor	30%	30
Final Presentation/Viva	Internal + External	30%	30
Attendance/Soft Skills	Industry Supervisor	10%	10
		Total	100

परिशिष्ट १- आंतरवासिता हमीपत्र

१. विद्यार्थ्याचे नाव			
२. सध्याचा पत्ता			
३. कायमस्वरूपी पत्ता			
४. ई-मेल आयडी			
५. भ्रमणध्वनी (मोबाईल)क्र.			
६. आधार क्र.			
७. पॅन क्र.			
८. एकूण जी.पी.ए.(सरासरी श्रेयांक) (आंतरवासिता करण्यापूर्वी पूर्ण केलेल्या सर्व सत्रांची सरासरी श्रेयांक)			
९. आंतरवासिता पध्दत (ऑफ लाईन/ऑ लाईन/हायब्रीड मोड)			
१०.आंतरवासिता प्राधान्ये			
	स्थळ (Place)	प्रमुख क्षेत्र (Sector)	संस्था/संघटना (Institute/ Organisation)
प्राधान्य-१			
प्राधान्य-२			
प्राधान्य-३			
मी आंतरवासिता भोरणाच्या अटी, शर्ती आणि आवश्यकतांशी सहमत आहे. विद्यार्थ्याची स्वाक्षरी: ----- दिनांक:-----			
सदर विद्यार्थ्याने आंतरवासिता परिचय वर्गात भाग घेतला आहे आणि आंतरवासिता कार्यक्रमात भाग घेण्यासाठी आवश्यक ती सर्व कागदपत्रे आणि प्रक्रियेच्या गरजा पूर्ण केल्या आहेत याची मी खात्री केली आहे. तसेच त्याने/तिच्या मार्गदर्शकाकडून मान्यता प्राप्त केली आहे.			
विभागातील समन्वयक शिक्षकाची स्वाक्षरी			
दिनांक:			

परिशिष्ट २ (अ) व्यक्तिगत माहिती प्रपत्राचा नमुना

नाव : -----

संपर्क क्रमांक आणि ईमेल आयडी -----

शिक्षण -----

उच्च शिक्षणसंस्थेचे नाव

वर्ष

१२ वी/मुख्य विषय :

सीजीपीए:

उच्च शिक्षणसंस्थेचे नाव :

वर्ष

पदवी/मुख्य विषय :

सीजीपीए:

आंतरवासिता/कामाचा अनुभव

संस्था - संघटना

प्रकल्प :

घोडक्यात माहिती :

शैक्षणिक अनुभव :

सत्र:

वर्ष:

प्रकल्प :

घोडक्यात माहिती :

इतर कर्तृत्व आणि वैयक्तिक आवडी निवडी

विद्यार्थ्याची स्वाक्षरी

परिशिष्ट ३ संस्थेस सेवा पुरविण्याबाबतचे पत्र

(अभिधिभाग/महाविद्यालयाच्या लेटरहेडवर)

प्रति,

व्यवस्थापक (मानव संसाधन)

विषय : <वर्ग> मध्ये शिक्षण घेणा-या विद्यार्थ्यांना - आउटवड्यांच्या आंतरवासिताची विनंती

मां. महोदय/महोदया,

<वर्ग> साली स्थापन झालेल्या <महाविद्यालय/विद्यापीठाचे नाव> ला सर्व शैक्षणिक उत्कृष्टता आणि पायाभूत सुविधांवरल-...मध्ये राष्ट्रीय मूल्यांकन आणि मान्यता परिषदेने <-----> श्रेणीची मान्यता दिली आहे.

वरील बाबी लक्षात घेता मी आपल्याला विनंती करतो की, आपल्या नामांकित संस्थेत कृपया आमच्या खालील <विद्यार्थी संख्या> विद्यार्थ्यांना व्यावहारिक प्रशिक्षणाची परवानगी द्यावी. आपली खातरजमा झाल्यानंतर विद्यार्थ्यांना प्रशिक्षणात दाखल होण्यासाठी किमान एक आउटवड्याचा कालावधी द्यावा.

अ.क्र.	नाव	उपस्थिती क्र Roll No.	वर्ष (प्रथम/द्वितीय/तृतीय/चतुर्थ)	विभाग (विषय)

या विद्यार्थ्यांची व्यक्तिगत माहिती प्रपत्रे या पत्रासोबत जोडलेली आहेत. आपल्याकडे रिक्त पदे असल्यास, कृपया वरील शाखांमधील विद्यार्थ्यांच्या मुलाखती घेण्यासाठी नियोजन करावे.

आपल्या संमतीची अपेक्षा!

आपला विश्वासू

नोडल अधिकारी/टीपीओ

(महाविद्यालयाचे/अभिधिभागाचे नाव आणि दिनांक)

परिशिष्ट ४ विद्यार्थ्यांचे कार्यमुक्तता पत्र

<अभिधिभाग/महाविद्यालयाच्या लेटरहेड>

प्रति,

मा. महाव्यवस्थापक (मानव संसाधन)

विषय : विद्यार्थ्यांचे कार्यमुक्तता पत्र.

मा. महोदय/महोदया,

कृपया उपरिनिर्दिष्ट विषयाच्या संदर्भातील आपले पत्र/ई-मेल दिनांक.....पहा. आपल्या प्रतिष्ठित संस्थेत खालील विद्यार्थी आपल्या अनुमतीने व आपल्या मार्गदर्शनाखाली आणि देखरेखीखाली औद्योगिक आंतरवासिता प्रशिक्षण घेतील :

अ.क्र.	नाव	उपस्थिती क्र Roll No.	वर्ष (प्रथम/द्वितीय/तृतीय/चतुर्थ)	विभाग (विषय)

हे प्रशिक्षण अभ्यासक्रमाचा आवश्यक भाग असल्याने प्रशिक्षणासाठी अभ्यासक्रमात खालील मार्गदर्शक तत्त्वे निश्चित करण्यात आली आहेत. त्यामुळे कृपया संबंधित विद्यार्थ्यांस मार्गदर्शकाने खालील मार्गदर्शक तत्त्वे सूचित करावीत, अशी विनंती करण्यात येत आहे.

- आंतरवासिताचे वेळापत्रक तयार करून त्याची एक प्रत आम्हाला पाठवावी.
- प्रत्येक विद्यार्थ्याने आंतरवासिता देनदिनी तयार करून अहवाल देणे आवश्यक आहे.
- कृपया दररोज विद्यार्थ्यांची आंतरवासिता देनदिनी तपासावी.
- प्रशिक्षण काळातील कामाच्या वेळांबाबत सूचना देणे आणि उपस्थितीची नोंद राखणे

विद्यार्थ्यांच्या कामगिरीचे मूल्यमापन खाली नमूद केल्याप्रमाणे उत्कृष्ट, अतिशय चांगले, समाधानकारक व असमाधानकारक अशा गुणांकनाच्या आधारे करावे, अशी विनंती आहे.

- उपस्थिती आणि सामान्य वर्तन
- कामगार आणि पर्यवेक्षकांशी संबंध
- शिकण्यासाठी पुढाकार आणि प्रयत्न
- ज्ञान आणि कौशल्य सुधारणा
- संस्थेला दिलेले योगदान

प्रशिक्षण पूर्ण झाल्यानंतर सीलबंद लिफाफ्यात कामगिरीचा अहवाल, स्वाक्षरी करण्या-या अधिका-यास अर्पित करावा. या संदर्भातील आपल्या प्रयत्नांमुळे विद्यार्थ्यांचे ज्ञान आणि व्यावहारिक कौशल्ये यामध्ये सकारात्मक वाढ होईल. आपल्या सहकार्यांवरल मनःपूर्वक धन्यवाद आणि त्यासाठी आम्ही कृतज्ञ आहोत.

विद्यार्थी संस्थेच्या नियमांचे पालन करतील आणि आंतरवासितादरम्यान योग्य ती शिस्त पाळतील. विद्यार्थी आपल्याला तारखेनुसार अहवाल देतील सोबत-कंपनी/संस्थेकडून आलेले पत्र या पत्राची प्रत

आपले विश्वासू,

नोडल अधिकारी/टीपीओ

(अभिधिभागाचे/महाविद्यालयाचे नाव आणि दिनांक)

परिशिष्ट ५ विद्यार्थ्यांच्या कामांची देनदिनी (नोंदीचे स्वरूप)

आठवडा	नेमून दिलेले काम	केलेले उपक्रम	मुख्य शिक्षण (प्राप्त ज्ञान/ कौशल्ये)	पूरक टिप्पणी

उद्योग-पर्यवेक्षकाची स्वाक्षरी

परिशिष्ट ६ उपस्थिती पत्रक
(आंतरवासिता देण्या-या संस्थेच्या अधिकृत लेटरहेडवर)

संस्थेचे नाव व पत्ता

विद्यार्थ्याचे नाव	
उपस्थिती क्र.	
अभ्यासक्रमाचे नाव	
प्रशिक्षण सुरू होण्याची तारीख	
प्रशिक्षण पूर्ण होण्याची तारीख	

महिना आणि वर्ष :

आठवडा	सोमवार	मंगळवार	बुधवार	गुरुवार	शुक्रवार	शनिवार
१						
२						
३						
४						
५						
६						
७						
८						
९						
१०						

- उपस्थिती पत्रक प्रशिक्षण देनदिनीमध्ये चिकटवून ठेवावे. ते काढू नका किंवा फाडू नका.
- उपस्थिती रकान्यामध्ये लाल शाईने सुट्ट्या चिन्हांकित केल्या पाहिजेत. अनुपस्थितीला लाल शाई 'अ' म्हणून चिन्हांकित करावे

आंतरवासिता पर्यवेक्षकाचे नाव आणि स्वाक्षरी

परिशिष्ट ७ पर्यवेक्षकाचा आंतरवासिता-मूल्यमापन अहवाल
(आंतरवासिता देण्या-या संस्थेच्या अधिकृत लेटर हेडवर)

विद्यार्थ्याचे नाव -----
 दिनांक -----
 कार्य पर्यवेक्षकाचे नांव :-----
 आंतरवासितेचे पदनाम -----
 संस्था/संघटना -----
 आंतरवासिताचा पत्ता -----
 आंतरवासिता तारखा -----पासून ते -----पर्यंत

कृपया आपण खालील वर्तन ज्या वारंवारीतेने काळजीपूर्वक पाहिले ते दर्शवून आंतरवासिता विद्यार्थ्याचे मूल्यांकन करा:

मापदंड/निकष:	सुधारण होणे अपेक्षित	समाधानकारक	चांगला	उत्कृष्ट
वर्तन Behaviors				
कामकानातील विश्वासार्हता Performs in a dependable manner				
सहकारी आणि पर्यवेक्षकांवर सहकार्य Cooperates with co-workers and supervisors				
कामकानातील अभिरुची Shows interest in work				
प्रशिक्षणातील गती Learns quickly				
उपक्रमशीलता Shows initiative				
कामकानातील गुणवत्ता Produces high quality work				
जबाबदारीचे भान Accepts responsibility				
टीका-टिपण्णची स्वीकारता Accepts criticism				

संघटनात्मक कौशल्यांतील निपुणता Demonstrates organizational skills				
तांत्रिक ज्ञान आणि कौशल्यांचा वापर Uses technical knowledge and expertise				
उचित न्यायनिर्णयक्षमता Shows good judgment				
नवीनमितीक्षमता आणि कल्पकता Demonstrates creativity/originality				
समस्यांचे प्रभावीपणे विश्लेषण Analyzes problems effectively				
स्वावलंबन Is self-reliant				
संवादक्षमता Communicates well				
प्रभावी लेखनशैली Writes effectively				
व्यावसायिक अनिवृत्ती Has a professional attitude				
व्यावसायिक वर्तनव्यवहार Gives a professional appearance				
वक्तृशीरपणा Is punctual				
वेळेचा प्रभावी वापर Uses time effectively				

टांतरवासिता विद्यार्थ्यांची सर्वांगीण कामगिरी :सुधारणा/समाधानकारक/चांगले/उत्कृष्ट (यापैकी टिक करा)

अतिरिक्त टिप्पण्या (असल्यास) :

उद्योग पर्यवेक्षकाची स्वाक्षरी -----

नाव -----

मानवसंसाधन व्यवस्थापकाची स्वाक्षरी -----

नाव -----

परिशिष्ट ८ विद्यार्थ्यांचा आंतरवासिता अनुभव : अभिप्राय

(आंतरवासिता पूर्ण झाल्यानंतर विद्यार्थ्यांनी भरावे)

विद्यार्थ्यांचे नाव : _____
दिनांक : _____
औद्योगिक पर्यवेक्षकाचे नाव : _____
पदनाम : _____
पर्यवेक्षक ईमेल : _____
आंतरवासिता: _____सवेतन-_____विनावेतन-_____
संस्था/संघटना : _____
आंतरवासिताचा

पत्ता: _____
शिक्षक समन्वयक : _____
विभाग _____

आंतरवासिता दिनांक _____पासून ते _____पर्यंत

आपल्या आंतरवासिताच्या कामाचे थोडक्यात वर्णन द्या (आपण ज्यासाठी जबाबदार आहात त्या कामांची नावे स्वरूप):

तुमचा आंतरवासिताचा अनुभव तुमच्या अभ्यासाच्या प्रमुख क्षेत्राशी संबंधित होता का?

- होय/व-याच अंशी
- होय/थोडक्यात प्रमाणात
- नाही/अजिबात नाही

खालील विधानांशी आपण किती प्रमाणात सहमत किंवा असहमत आहात हे दर्शावा.

हा अनुभव असा आहे:	पूर्णपणे सहमत	सहमत	मत नाही	असहमत	पूर्णपणे असहमत
मला व्यवसाय क्षेत्र शोधण्याची संधी दिली Given me the opportunity to explore a career field					
मला सराव करण्यासाठी वर्गातील सिद्धांतांचे उपयोजन करण्याची परवानगी दिली Allowed me to apply classroom theory to practice					
माझी निर्णयक्षमता आणि समस्या सोडविण्याची कौशल्य विकसित करण्यास मदत केली Helped me develop my decision-making and problem-solving skills					
कायमस्वरूपी नोकरीपूर्वी मला कार्यविश्वाशी संबंधित ज्ञानप्राप्तीसाठी मदत झाली Expanded my knowledge about the work world prior to permanent employment					

मला माझे लेखी आणि मौखिक संप्रेषण कौशल्ये विकसित होण्यासाठी मदत द्या- Helped me develop my written and oral communication skills					
नेतृत्व कौशल्ये वापरण्याची संधी दिली (इतरांवर प्रभाव पाडणे, इतरांसोबत कल्पना विकसित करणे, निर्णय घेण्यास आणि कृतीस अत्तेजन देणे) Provided a chance to use leadership skills (influence others, develop ideas with others, stimulate decision-making and action)					
कामाच्या संबंधातील नैतिक परिणामांबद्दल माझी संवेदनशीलता वाढविली Expanded my sensitivity to the ethical implications of the work involved					
अनोख्या परिस्थितीत आत्मविश्वासपूर्वक वागण्याकरिता आत्मकबळ दिले Made it possible for me to be more confident in new situations.					
मला माझे पारस्परिक कौशल्य सुधारण्याची संधी द्या- Given me a chance to improve my interpersonal skills					
मला जबाबदारी हाताळायला आणि वेळेचा सुयोग्य वापर करायला मदत केली. Helped me learn to handle responsibility and use my time wisely					
मला स्वतःचे नवीन पैलू शोधण्यात मदत केली जी मला पूर्वी माहित नव्हती Helped me discover new aspects of myself that I didn't know existed before					
मला नवी अभिरुची आणि क्षमता विकसित करण्यासाठी मदत केली Helped me develop new interests and abilities					
मला माझ्या कार्यक्षेत्राची उद्दिष्टे स्पष्ट करण्यास मदत केली Helped me clarify my career goals					
मला भविष्यात रोजगार मिळू शकेल यासाठी आवश्यक संपर्क साधने पुरविली Provided me with contacts which may lead to future employment					

मला माहिती मिळविण्यासाठी आणि / किंवा ती वापरण्यासाठी संस्थेत उपलब्ध नसलेली उपकरणे वापरण्याची परवानगी दिली. Allowed me to acquire information and/or use equipment not available at my Institute					
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- संस्थेच्या आंतरवासिता कार्यक्रमात शिक्षकांनी विद्यार्थ्यांसाठी मार्गदर्शक असणं अपेक्षित आहे.

तुमच्या शिक्षक समन्वयकाने असे काम केले असे तुम्हाला वाटते का? होय/नाही नसल्यास का?

- आपल्या शिकण्याच्या करारामध्ये निर्धारित केलेली प्रारंभिक ध्येये, कार्ये आणि नवीन कौशल्ये आपण किती चांगल्या प्रकारे पूर्ण करू शकलात? आपण कोणत्या प्रकारे नवीन दिशा घेण्यास किंवा आपल्या कराराच्या पलीकडे विस्तार करण्यास सक्षम आहात? होय/नाही नसल्यास का?
- आपण कोणत्या क्षेत्रात सर्वात जास्त विकास आणि सुधारणा केली?
- आपल्या आंतरवासिता काळातील सर्वात महत्त्वपूर्ण कामगिरी किंवा समाधानाचा क्षण कोणता होता?
- आंतरवासितामध्ये तुम्हाला काय आवडले नाही?
- तुमचा एकंदर अनुभव लक्षात घेता तुम्ही या आंतरवासिताचे मूल्यमापन कसे कराल?

समाधानकारक/चांगले/उत्कृष्ट (एकाला गोल करा)

- आपला आंतरवासिताचा अनुभव कसा सुधारता आला असता याबद्दल सूचना द्या (तुम्हाला अतिरिक्त जबाबदारी सांभाळता आली असती का? आपल्या आंतरवासिताबद्दल तुमच्या शिक्षकांशी अधिक चर्चा करणे आपल्याला आवडले असते का? बारकाईने देखरेखीची गरज होती का? अधिक उजळणीची गरज होती का?)

विद्यार्थ्यांची स्वाक्षरी -----

नाव, -----

उपस्थिती क्रमांक, -----

दिनांक-----

**परिशिष्ट ९ संस्थेच्या आंतरवासिता मूल्यमापन अहवाल : नमुना प्रपत्र
(अधिविभागाच्या/महाविद्यालयाच्या लेटरहेडवर)**

- विद्यार्थ्यांचे नाव -----
भ्रमणध्वनी (मोबाईल) क्र. -----
- उपस्थिती क्र. -----
- शाखा/सत्र -----
- प्रशिक्षण कालावधी -----
- घरचा पत्ता (संपर्क क्रमांकासह) -----
- प्रशिक्षण (आंतरवासिता) स्थळाचा पत्ता -----
- प्रशिक्षण देणा-या संस्थेचा पत्ता -----
- प्रशिक्षण/पर्यवेक्षकाचे प्रभारीचे नाव/पदनाम -----
- कामाचे स्वरूप -----
- मूल्यमापन दिनांक -----
- कृपया खालील बाबींचे मूल्यांकन करा :

अ.क्र.	तपशील	गुण पैकी	गुण पैकी	मिळालेले गुण
१.	सादरीकरणाची गुणवत्ता आणि परिणामकारकता	१०	५	
२.	ज्ञानाची सखोलता आणि प्रात्यक्षिक कौशल्ये	१०	५	
३.	शिकण्याच्या अनुभवाची विविधता आणि प्रसंगिता	१०	५	
४.	व्यावहारिक अनुप्रयोग आणि शिकवलेल्या संकल्पनांशी संबंध	१०	५	
५.	आंतरवासिता अहवाल	३०	१५	
६.	उपस्थितीची नोंद, विद्यार्थी लॉग, पर्यवेक्षक मूल्यमापन	३०	१५	

समग्र श्रेणी :

मार्गदर्शकाची स्वाक्षरी

Annexure II

B. Sc. III, Sem. VI

Field Project

(2 Credits)

Format of Report

- Front Page
- Certificate
- Index
- Introduction
- Surveys, Field Visits
- Experimental Studies/Results/Observations/Calculations
- Summary, Findings and Outcomes
- References

Guidelines of Evaluation:

FP will be evaluated through a detailed report submission followed by oral examination evaluated by the examiners/experts appointed by the Examination Section of the University. Maximum 20 students per batch will be evaluated per day for FP. The FP will be evaluated as per the following marks distributions:

Marks Distribution of Field Project:

Component	Evaluator	Weightage	Marks
Field Work	Field Supervisor/Guide	30%	15
Report	Internal Guide	30%	15
Final Presentation/Viva	Internal + External	30%	10
Attendance/Soft Skills	Field Supervisor	10%	10
		Total	50

B.Sc. III Syllabus (NEP-2.0)
To be implemented from June 2026 onwards

VOCATIONAL SKILL COURSE

Semester V and VI

Nature of Practical Exam

No. of Examination Days- 01

Semester-V Practical Paper-II (50 Marks)

Q. 1 Experiment I- 20 Marks

Q. 2 Experiment II - 20 Marks

Q. 3 Oral - 5 Marks

Q. 4 Journal- 5 Marks

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SKILL ENHANCEMENT COURSE
Semester VI

Nature of Practical Exam

Semester-VI Practical Paper-III (50 Marks)

- Q.1 Experiment- 20 Marks
- Q.2 Experiment- 20 Marks
- Q.3 Oral- 5 Marks
- Q.4 Journal- 5 Marks

Shivaji University, Kolhapur

B.A./B.Com. III Syllabus

(NEP-2.0)

To be implemented from June 2026 onwards

Semester V

Open Elective Course in

Electronics Nature of Practical

Exam

Practical Paper-I (50 Marks)

Q.1 Experiment- 20 Marks

Q.2 Experiment- 20 Marks

Q.3 Oral - 5 Marks

Q.4 Journal- 5 Marks

Nature of theory question paper-

(Total 40 marks)

Q. 1 Multiple Choice Questions

(8 marks)

a) To h)

Q. 2 Attempt any two

(16 marks)

Q.3 Attempt any four

(16 marks)