

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

Three Years- Six Semesters Bachelor's Degree Programme

3 Years B.Sc. /4 Year B.Sc. (Hons) & 4 Year B.Sc. (Hons with Research) Programme



Faculty of
Science and Technology
(Science Group)

Subject: ELECTRONICS
(Semesters I and II)

Effective from Academic Year 2026-27
(As per Uniform NEP 2020)

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SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FACULTY: Science and Technology
Subject: ELECTRONICS
Teaching and Learning Scheme for the Degree of Bachelor of Science (B.Sc.)
Three Years / Four Years - (Six/ Eight Semesters) Bachelor Degree Programme

Examination, Evaluation and Assessment Scheme

Vertical No.	The Vertical	Mode of Examination & Evaluation Assessment	Theory					Theory (Total)		Practical						Practical (Total)	
			External			Internal				External			Internal				
			Max Marks	Min Marks	Durati on (Hrs.)	Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks	Durati on (Hrs.)	Max Marks	Min Marks	Max Marks	Min Marks	
A	Major	External & Internal	30	9	2	20	6	50	20	25	10	4	25	10	50	20	
	IKS Major Specific		30	9	2	20	6	50	20	--	--		--	--	--	--	
B	Minor		30	9	2	20	6	50	20	25	10	4	25	10	50	20	
C	Generic/ Open Elective		30	9	2	20	6	50	20	--	--		--	--	--	--	
D	VSC	Internal	---	---						--	--		50	20	50	20	
	SEC	Internal	---	---						--	--		50	20	50	20	
F	Internship/ Apprenticeship	Internal	Assessment of these verticals shall be based on various activities/practices. It shall be evaluated by giving maximum marks of 50 per 2 Credit Course with separate activity weightages/levels. A detailed SOP for this assessment process shall be prescribed separately														
	FP/CEP																
	CC																

Internal Assessment for Theory/Practical/Laboratory:

All the internal assessments should be conducted on the basis of Continuous Assessment Tests (CAT).

Continuous Assessment Tests (CAT):

For internal assessment, the Continuous Assessment Tests (CAT) shall be conducted as under

- Three CAT each of 10 Marks (Theory) and 10 Marks (Practical).
 - First on completion of 25% Syllabus of the course or on completion of 25 teaching days,
 - Second on completion of 50% Syllabus of the course or on completion of 50 teaching days,
 - Third on completion of 75% Syllabus of the course or on completion of 75 teaching days. .
- Each concurrent assessment (CAT-I, II & III) will be mapped to relevant Course Learning Outcome.
- Total Performance in CAT (i.e.40 %) shall be based on the best two out of three in CAT examinations
- Internal assessment shall be carried out by the respective course teacher by choosing variety of assessment tools/methods such as class test, seminar, case study, field work, mini project work, quiz or any innovative method, which may be deemed to be appropriate for assessing the relevant course outcome.

External Assessment for Practical (Major/ Minor Lab):

• Practical Performance	:	20 Marks
• Viva-Voce	:	05 Marks
• Total	:	25 Marks
• Duration of Examination	:	04 Hrs.

Internal Assessment for Practical (Major/ Minor Lab):

• Internal Assessment based on CAT :	15 Marks
• Record Book :	10 Marks
• Total :	25 Marks

Internal Assessment for Practical (SEC/ VSC Lab):

• Internal Assessment based on CAT :	20 Marks
• Record Book :	10 Marks
• Attendance :	10 Marks
• 10 MCQ/short Question :	10 Marks
• Total :	50 Marks
• Duration of End Semester Examination:	04 Hrs.

Note: The external assessments of theory courses will be conducted in accordance with the guidelines issued by the SGBA University.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
FACULTY: Science and Technology
Subject: ELECTRONICS
Teaching and Learning Scheme: for the Degree of Bachelor of Electronics (B.Sc.)
Three Years / Four Years- (Six / Eight Semesters) Bachelor's Degree Programme

FIRST YEAR: Level 4.5 - SEMESTER – I (T & L Credit Scheme)

Mode of Teaching	Vertical Number	The Vertical	Type of Course	Course Code	Course Name	Credits	Workload (Hrs/Week)	Vertical Workload (Hrs/Week)
Classroom Teaching / Lab Work (Practical)/ Outdoor / Field	a.	Major (Electronics)	Theory1	113201	Fundamental of Electronics	2	2	6
			Lab/ Practical 1	113202	Practical based on Major Theory 1	2	4	
	b.	Minor (Other subject in combination with Electronics)	Theory 1	113201	Fundamental of Electronics	2	2	6
			Lab/ Practical 1	113202	Practical based on Minor Theory 1	2	4	
	c.	Generic/ Open Elective (Other than Science & Technology faculty)	Theory 1	113203	CCTV Installation and Maintenance	2	2	4
			Theory 2	113204	E-Waste Management	2	2	
	d.	VSC	----	----	----	---	---	4
		SEC	Lab/ Practical 2	113205	Skill Oriented Practical on Major Electronics	2	4	
	e.	AEC - English	Theory	-	--	1	1	6
		AEC –MIL	Theory	-	--	1	1	
		IKS-Generic	Theory	-	--	2	2	
		VEC	Theory	-	--	2	2	
	f.	iii) CC	Outdoor	-	Course on Health & Wellness, Yoga Education, Sports, Fitness, Cultural Activities, NSS/ NCC & Fine/ Applied/ Visual/ Performing Arts.	2	4	4
		TOTAL				22	30	30

Major / Minor Theory 1 - Fundamentals of Electronics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	113201	Fundamentals of Electronics	2	30	2 Hrs	30

Course Objectives:	• Read, understand and interpret electrical/electronic circuits through verbal, mathematical and graphical methods. • To give need-based education in Electronics of the highest quality at the undergraduate level. • Use Information Communication Technology to gather knowledge. • Impart skills required to gather information from resources. • Equip students in methodology related to electronic circuits, devices and systems.			
Course Outcome:	• Identify electronic components and ICs. • Design system components that meet the requirement of public safety and offer solutions to the societal and environmental concerns. • Apply research-based knowledge to design and conduct experiments. • Construct, choose and apply the techniques, resources and modern electronics tools required for Electronics applications. • Utilize the basic knowledge in Electronics science. • Apply Electronics knowledge in their day-to-day life.			
Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Basic Electronic components Introduction to Resistors, Capacitors, Inductors, Transformers, Switches, Battery, Fuses, Printed Circuit Boards, Relays.	8 Hrs	8 Marks	Besides classroom teaching demonstration of components and measuring instruments (physically and/or virtually), wherever applicable is expected.
Unit II	Network theorems Concept of ideal dc voltage and current source, KVL, KCL, Thevenin's, Norton's, Maximum power transfer, Millman's theorem (statement, proof, simple numerical application for dc only).	7 Hrs	7 Marks	
Unit III	Analog measuring instruments Principles of voltmeter, ammeter, ohmmeter, Multirange DC voltmeter, ohm per volt rating, loading effect, Multirange DC Ammeter, Series & shunt type ohmmeter, Multimeter (uses & drawback) CRO Block diagram & explanation, CRT construction & working, uses of CRO (measurement of frequency, amplitude & phase.)	8 Hrs	8 Marks	

Unit IV	Basics of Digital Instruments Functional block diagram, applications, advantages and limitations of: Digital voltmeter, Digital ammeter, Digital multimeter, Digital clampmeter, Digital storage oscilloscope, and Digital LCR meter.	7 Hrs	7 Marks	
References:	1. Basic Electronics by B. L. Thereja (S. Chand and Company) 2. Digital and Analog Technique by Navneet, Kale and Gokhale 3. Element of electronics by Bagde and Singh (S. Chand and Company) 4. Principles of electronics by V. K. Mehta 5. Introduction to digital electronics by Mohinder Singh 6. Electrical and electronics measurement and Instrumentation by A. K. Sawhney 7. Text book of Electrical Technology by B. L. Thereja			
Model Questions:	MCQs for Internal Assessment. 1. Unit of Resistance is----- a) Volt b) Ohm c) Ampere d) Watt 2. In colour code system tolerance of gold colour is---- a) 1% b) 5% c) 10% d) 20% 3. Unit of inductance is ----- a) Ohm b) Watt c) Henry d) Volt 4. KCL stands for---- a) Kelvin Current Law b) Kirchoffs Current Law c) Kelvin Capacitance Law d) Kirchoffs Capacitance Law 5. KVL stands for----- a) Kelvin Voltage Law b) Kirchoffs Value Law c) Kelvin Value Law d) Kirchoffs Voltage Law 6. Voltmeter is always connected in----- in circuit a) Series b) Parallel c) Both a and b d) None 7. Ammeter is always connected in----- in circuit a) Series b) Parallel c) Both a and b d) None 8. CRO is not used to measure---- a) Volt b) Current c) Velocity d) Frequency Short answer Type 1. Name the active and passive components used in electronic circuit. 2. Write function of capacitor. 3. Write Kirchoff's laws. 4. What is Ideal current source? 5. What is loading effect? 6. Write application of CRO. 7. What is function of Multimeter? 8. Explain how voltmeter connected in circuit. Long answer type : 1. Explain colour coding of Resistor. 2. State and explain Maximum power transfer theorem. 3. Explain construction and working of CRT. 4. Explain how voltage and frequency are measured by using CRO.			

Major/ Minor Lab / Practical –1: Practical on Fundamentals of Electronics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	113202	Practical based on Theory 1	2	60	4 Hrs	50

Lab/ Practical 1	List of Experiments 1. To calculate value of unknown Resistance of given Resistor using Resistor color code system. 2.To study and verify Kirchoff's voltage law. 3.To study and verify Kirchoff's current law. 4.To study and verify Thevenin's Theorem. 5.To study and verify Norton's Theorem. 6.To study and verify Maximum Power transfer Theorem. 7.To study and verify Millman's Theorem. 8.To study Voltmeter for the measurement of unknown voltage. 9.To study Ammeter for the measurement of unknown current. 10.To study CRO for the measurement of Unknown frequency. 11.To study CRO for the measurement of Amplitude. 12.To study Lissajous pattern for the measurement of frequency. 13.To study Lissajous pattern for the measurement of phase. 14.To study Digital multimeter for the measurement of Voltage, Current and Resistance.
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Note :

- Students during lab hours shall have to perform at least 10 experiments, however students shall have to perform one experiment at the time of examination.

FOR BASKET (GOEC-1): For Students of Sem-I of the program other than Science & Technology Faculty.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	113203	CCTV Installation and Maintenance	2	30	2 Hrs	30
Course Objectives:		- To know about security system and its importance. - To understand and interpret electrical/electronic circuits of CCTV. - To provide the knowledge about the various cables. - To provide the knowledge about the various CCTV cameras. - Impart skills required to installation and maintenance of CCTV system.					
Course Outcomes:		- Identify electronic components and circuits related to CCTV. - Identify and analyze different cables and their interconnections. - Identify and analyze different cameras and their interconnections - Utilize the knowledge of CCTV software and its installations. - Troubleshooting and maintenance of CCTV systems.					

Unit	Contents	Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	Introducing CCTV Introduction to Closed Circuit Television (CCTV) Technology, Block diagram of CCTV, Basic components of an analogue CCTV system, Transmission Medium, recording units (DVR), Power supply unit, Assembling a basic analogue CCTV system.	8 Hrs.	8 Marks	- While teaching CCTV Installation and Maintenance, the suitable pedagogical strategies should be adapted. - These strategies include both Troubleshooting and maintenance of CCTV systems. - Process of using CCTV Installation and Maintenance using Both physically and virtual tools.
Unit II	Cables used in CCTV Installation Types of Cable, Construction of Coaxial cable, Construction of Ethernet cable, Construction of network cable, Construction of Fiber-optic cable, advantages and disadvantages of the cables.	7 Hrs.	7 Marks	
Unit III	Types of CCTV Cameras and Installation Dome Camera, Bullet Type Camera, C-Mount Camera, Day/Night Camera, Infrared/Night Vision CCTV Camera, Varifocal Cameras, Wireless Cameras, Installing the Camera, Checking the Camera Functions.	8 Hrs.	8 Marks	
Unit IV	Tools and Maintenance Multimeter: Analogue and Digital, cable stripper, Soldering gun, Desoldering Pump. Installation Software, Connecting to Your Smartphone, Using Web Services, Potential Risk, Watching CCTV camera on Mobile and Laptop.	7 Hrs.	7 Marks	

References:	1. CCTV Surveillance by Herman Kruegle, Released March 2011. Publisher(s): Elsevier Science ISBN: 9780080468181 2. CCTV Handbook by Thomas Hill 3. Participant's Guide for CCTV Installation Technician (ELEQ Book 4605) Kindle Edition 4. CCTV Cameras Training by M.J. Ansari
Model Questions:	MCQs for Internal Assessment; 1. CCTV Stands for a) Closed circuit television b) Circuit capacitor television c) Community circuit television d) closed capacitor telephone 2. In which country the first CCTV system introduced a) India b) China c) Germany d) U.S.A. 3. Resolution is a) color of an image b) the size of an image c) no. of pixel d) none of these 4. Pixel derived from the word a) Picture element b) Picture elegant c) Picture emerge d) None of these Short answer type 1. What is CCTV? 2. Write application of CCTV. 3. What is DVR? 4. Classify various Cameras used in CCTV 5. Classify various Cables used in CCTV 6. What is the use of Multimeter? Long answer type 1. Draw the Block diagram of CCTV and Explain 2. Explain the Any three cables used in CCTV 3. Explain various cameras used in CCTV. 4. Explain tools used in CCTV installation.

FOR BASKET (GOEC-2) : For Students of Sem-I of the program other than that of Science & Technology Faculty

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	113204	E-waste Management	2	30	2 Hrs	30
Course Objectives:		- List the effects of e-waste on environment and health. - Discuss the need and requirements of the e-waste management - Make awareness of e-waste and e-waste management in society.					
Course Outcomes:		- Identify the physical and chemical composition of waste - Know about the environmental impacts of e-waste. - Apply various concept learned under e-waste management hierarchy - Distinguished the role of various national and internal act and laws applicable for e-waste management and handling. - Analyze the e – waste management measures proposed under national and global legislations					
Unit	Contents		Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies		
Unit I	Introduction to E-Waste Management: Definition and types of e-waste, Current e-waste scenario in India and the world, Environmental and health hazards of e-waste, Regulatory framework for e-waste management in India, Scope of the course.		7 Hrs	8 Marks	The suitable pedagogical strategies should be adapted.		
Unit II	E-Waste Collection, Segregation and Recycling: Collection and transportation of e-waste, Segregation of e-waste based on material type, Importance of proper segregation, Hands-on practice on e-waste segregation. Recycling technologies for different types of e-waste, advantages, and limitations of different recycling technologies, Environmental impact of recycling technologies		8 Hrs	8 Marks			
Unit III	E-Waste Management Strategies: Extended Producer Responsibility (EPR), Reverse logistics for e- waste management, Innovative e-waste management practices, Importance of public awareness and outreach.		7 Hrs	7 Marks			
Unit IV	E-Waste Management and Sustainable Development: The link between e-waste management and sustainable development goals, Role of e-waste management in achieving a circular economy, Business opportunities in e-waste management, Prospects of e-waste management in India.		8 Hrs	7 Marks			

References:	1. E-waste: implications, regulations, and management in India and current global best practices”, Johri R., TERI Press, New Delhi 2. Electronic Waste – 1 st Edition (Toxicology and Public Health Issues), Fowler B. 2017Elsevier 3. Electronic Waste Management. Science, Hester R.E., and Harrison R.M. 2009
Model Questions:	MCQs for Internal Assessment; ----- element/s is/are cause of e-waste. a. Lead b. Cadmium c. Beryllium d. All of the above -----are the main contributors of the e-waste in the world. a. Refrigerators/freezers, washing machines, dishwashers b. Small household appliances (toasters, coffee makers, irons, hairdryers) c. Personal computers, telephones, mobile phones, laptops, printers, scanners, photocopiers d. Gas cylinder, chimneys & home appliances - Which one of the following is an example of e-waste? a. Nuclear wastes, medical wastes, toxic industrial wastes, etc. b. Plastic bags, cardboard boxes, corroded metals, etc. c. Beverage cans, packaged boxes, plastic bottles, etc. d. Sensors, alarms, sirens, TV, etc. ----- produces the most e-waste per year. a) India b. China c. USA d. France Short answer type questions - State various types of waste. - What is E-waste? - State the common electronics devices that leads to E-waste Pollution. - Which E-waste is not recyclable? - What happens to the e-waste after it has been recycled? Long answer type questions - What is the impact of E-waste on environment? - Explain harmful effect of E-Waste on human being. - Explain the process how to reduce E-Waste pollution. - Explain one of the methods to recycle E-waste - Why recycling of E-waste is important, explain brief.

Lab / Practical –2: Skill based practical on Major-Electronics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	I	113205	Skill based practical on Major-Electronics	2	60	4 Hrs	50
Course Objectives:		• To reduce the unemployment by providing self- employment schemes. • To make the students skilled technician. • To reduce the mismatch between the demand and supply of skill man-power. • To develop attitudes, knowledge, and skills for entrepreneurship and self-employment.					
Course Outcomes:		After successful completion of the course, the students will be able to: • Apply their practical knowledge/ hands on training in the workplace. • It fulfills the demand of industry. • It develops skilled technician.					
Lab/ Practical 2		List of Experiments: 1. Identify the values of Resistor (Color Code), Capacitor and Inductor from Circuit Board. 2. Identify the values of Resistor, Capacitor and Inductor in their Series & Parallel combination from Circuit Board. 3. Identify various PCB used in electronic Circuit. 4. To prepare / design PCB for simple electronics circuits. 5. Identify the faults of Resistor, capacitor on circuit board by using Analog and Digital Multimeter 6. Test Diode, Transistor and Capacitor on circuit board by using Analog and Digital Multimeter 7. Study and to test various design of switches and Relays. 8. Soldering and desoldering of various components. 9. Study of analog multimeter for various measurements. 10. Use of Digital Clampmeter for various measurements. 11. Use of Digital LCR meter for various measurements. 12. Use of Digital Storage Oscilloscope for amplitude, frequency and phase measurements.					

Note: Mode of Examination: Internal (There is no External Examination)

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Three Years / Four Years- (Six / Eight Semesters) Bachelor's Degree Programme

FIRST YEAR: Level 4.5 - SEMESTER – II (T & L Credit Scheme)

Mode of Teaching	Vertical Number	The Vertical	Type of Course	Course Code	Course Name	Credits	Workload (Hrs/Week)	Vertical Workload (Hrs/Week)
Classroom Teaching /Lab Work (Practical)/ Outdoor / Field	a.	Major (Electronics)	Theory 2	113206	Semiconductor Devices	2	2	6
			Lab/ Practical 3	113207	Practical based on Major Theory 2	2	4	
	b.	Minor (Other subject in combination with Electronics)	Theory 2	113206	Semiconductor Devices	2	2	6
			Lab/ Practical 3	113207	Practical based on Minor Theory 2	2	4	
	c.	Generic/ Open Elective (Other than Science & Technology faculty)	Theory 3	113208	Maintenance & Troubleshooting of Electronic Applications	2	2	4
			Theory 4	113209	Computer Hardware & Maintenance	2	2	
	d.	VSC	Lab/ Practical 4	113210	Advanced Practical on Major Theory 2	2	4	8
		SEC	Lab/ Practical 5	113211	Skill Oriented Practical on Major Electronics	2	4	
	e.	AEC - English	Theory	-		1	1	4
		AEC –MIL	Theory	-		1	1	
		VEC	Theory	-		2	2	
	f.	iii) CC	Outdoor	-	Course on Health & Wellness, Yoga Education, Sports, Fitness, Cultural Activities, NSS/ NCC & Fine/ Applied/ Visual/ Performing Arts.	2	4	4
		TOTAL				22	32	32

Major / Minor Theory 2 – Semiconductor Devices

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Mark
4.5	II	113206	Semiconductor Devices	2	30	2 Hrs	30
Course Objectives		- To provide understanding about building and design of power supply. - To provide knowledge about junction transistors and its applications in circuits. - To provide understanding about optoelectronics devices and their uses. - To provide knowledge of Integrated circuits and its fabrications.					
Course Outcomes		- Student will be able to design and build power supply. - Design various circuits using various transistors. - Able to make various applications of optoelectronics devices. - Will acquire the knowledge about integration of electronics components for IC fabrication.					
Unit System	Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies	
Unit I	Semiconductor Diodes and Rectifiers Operation and characteristics of PN junction diode, Avalanche and Zener breakdown mechanisms, Zener diode as voltage regulator, Half wave and full wave rectifiers (ripple factor, efficiency and PIV ratings), C, L and Π filters.			8 Hrs	8 Marks	- Besides classroom teaching demonstration of semiconductor devices and its applications (physically and/or virtually), wherever applicable. - Process of IC fabrication using virtual tools.	
Unit II	Junction transistors NPN and PNP transistor (construction and working), CB, CE & CC configurations, leakage currents, Input and output characteristics of CE mode, Relation between α and β , Construction, working and characteristics of UJT, FET and MOSFET.			8 Hrs	8 Marks		
Unit III	Optoelectronics devices Construction, working & characteristics of LDR, LED, Photodiode, Phototransistor and Photovoltaic cell (Solar cell).			7 Hrs	7 Marks		
Unit IV	Integrated Circuits Introduction to IC technology, Advantages and disadvantages, Classification of ICs, Scale of integration up to V^2 LSI, Basic steps in fabrication of monolithic ICs, Fabrication of resistor, diode & transistor. Basic concept of Embedded systems			7 Hrs	7 Marks		

References	1. Digital and analog technique by Navneet, Kale and Gokhale (Kitab mahal prakashan) 2. Introduction to digital electronics by Mohinder Singh 3. Digital principle and application by Malvino and Leach 4. Modern digital electronics by R. P. Jain 5. Pulse, digital and switching waveforms by Millman and Taub 6. Principle of electronics by V.K.Mehta 7. Basics of electronics by B.L.Thereja
Model questions for theory external examination.	
MCQ for Internal Assessment	MCQs for Internal Assessment; 1. The half wave rectifier circuits use ---- a) One diode b) Two diode c) Three diode d) Four diode 2. Ripple factor of full wave rectifier is ---- a) 50.4% b) 20% c) 48.2% d) 47.2% 3. The Zener diode is frequently used as ---- a) Regulator b) Rectifier c) Amplifier d) Oscillator 4. The number of P-N junctions in BJT is ---- a) Three b) Two c) One d) None 5. The FET is ---- device (a) Bipolar (b) Unipolar (c) Monopolar (d) None of these 6. IC stands for _____. (a) Integrated circuit (b) Ionization current (c) Inverse current (d) Integrated current 7. ---- cannot be fabricated in an IC. (a) Transistors (b) Diodes (c) Resistors (d) Inductors 8. The LED emits light only when it is in ---- biased. (a) forward (b) reverse (c) inverse (d) none.
Short answer questions	Short answer type 1. What is biasing of diode? 2. Write application of diodes. 3. Draw symbol of LED and LDR. 4. Explain principle of Phototransistor. 5. Write scale of integration of IC's. 6. Write steps of fabrication of monolithic IC's. 7. What is SSI? 8. What is rectifier?
Long answer questions	Long answer type 1. Explain construction and working of half wave rectifier circuit. 2. Explain construction and working of NPN transistor. 3. Explain construction and working of Phototransistor. 4. Explain fabrication of diode in IC.

Major & Minor Lab / Practical – 3: Practical based on Semiconductor Devices

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Mark
4.5	II	113207	Practical based on Semiconductor Devices	2	60	4 Hrs	50

Lab/ Practical 3	Perform at least ten experiments. 1. To study VI characteristics of PN junction diode under forward bias mode. 2.To study VI characteristics of PN junction diode under reverse bias mode. 3.To study half wave rectifier. 4.To study full wave centre tapped rectifier. 5.To study full wave bridge rectifier. 6.To study C, L and Π filters. 7.To study input and output characteristics of transistor in CE mode. 8.To study input and output characteristics of transistor in CB mode. 10.To study output and transfer characteristics of FET and derive FET parameters. 11.To study output and transfer characteristics of MOSFET. 12. Study of LDR. 13. Study of LED. 14. Study of UJT.
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Note :

- Students during lab hours shall have to perform at least 10 experiments, however students shall have to perform one experiment at the time of examination.

GOEC-3 : For the students of Sem-II of the program of other than that of Science & technology faculty.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Mark
4.5	II	113208	Maintenance and troubleshooting of Electronic Appliances	2	30	2 Hrs	30
Course Objectives		This practical-based course complements the theoretical knowledge of electrical and electronics maintenance with hands-on activities. - To provide theoretical knowledge to real-world electrical and electronic scenarios with safety. - Also to provide knowledge to real-world electrical and electronic maintenance of general electronic appliances. - To demonstrate proficiency in troubleshooting using tools and equipment as well as its maintenance. - To provide knowledge for troubleshooting and repairing of common electrical and electronic faults.					
Course Outcomes		After learning the course, the students will be able to: - Demonstrate a fundamental understanding of electrical and electronic principles, laws, circuit analysis, and semiconductor behavior. - Demonstrate proficiency in PCB tracing, diagnostics and repairs. - Develop effective troubleshooting techniques and a systematic approach to diagnose and rectify electrical and electronic faults. - Develop expertise in repair and assembly of Electric irons, Electric kettles, Fan regulators, Mobile chargers, LED bulbs, LED Tubelight, Electric boards & Electronic kits. - Develop to design various power supplies required for different purposes.					
Unit System		Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I		Safety precautions for operator and appliances: Safety signs, messages and warnings; Use of Personnel Protective Equipment (PPE); Preventive measures and First aids; Identifying Phase, Neutral and Earth on sockets and Appliances; Identifying Voltage, Current and Power rating of Appliances; Study of Installation process and User manuals.			8 Hrs	8 Marks	While teaching Electronics as a complete subject, classical and contemporary innovations pedagogies are to use, for integration into the Teaching, Learning, and Evaluation processes. Technology based pedagogy should involve use of advance electronic tools, instruments, media and other available e-
Unit II		Connection tracing and fault finding of appliances: Tracing of connections from AC mains supply, Tracing of Power Supply section, Tracing of Intermediate and Output section, Section wise testing of electronic components and ICs, Tracing and fixing of actual faults, Common faults in general appliances.			7 Hrs	7 Marks	

Unit III	Testing and troubleshooting of various power supply: Rectifiers: Half-wave and Full-wave Rectifiers; Block diagram of Regulated power supply; IC 78XX and 79XX series of voltage regulators; IC 723 as voltage regulators; Fixed and variable power supply using IC 317.	8 Hrs	8 Marks	resources to enhance the students learning experience. This entails use of ICT tools to interact and work with students to accomplish goals, objectives and outcomes effectively. Along with theoretical and practical teaching methods; enquiry based, problem based, project based, simulation based and field work based methods will be accepted to enhance comprehension of the course contents.
Unit IV	Repair and replacement of electronic parts: Identification and testing of various electronic components, Working and repair of : Electric Irons, Electric Kettles, Fan Regulators, Mobile chargers, LED Bulbs, LED Tube lights, Electric Boards & Electronic Kits.	7 Hrs	7 Marks	
References	Books: 1. Shashi Sinha, Handbook of Repair & Maintenance of Domestic Electronics appliances, IBP Publications 2. Doug Lowe, Electronics – All in one for Dummies, third Edition. 3. Institution of Engineering and Technology, Guide to Electrical Maintenance, 2nd Edition, IET. A. K. Mittal, Electronic Mechanic: 3 in 1, Computech Publication 4. Horowitz & Hill, The Art of Electronics; Cambridge University Press, 3rd edition, 2015 5. Mark I. Montrose, PCB Design Techniques for EMC Compliance: A Handbook for Designers, Wiley-IEEE Press, 2000. E-resources: 1. NPTEL - Basic Electrical Circuits, Prof. Nagendra Krishnapura, IIT Madras 2. NPTEL - Power Electronics, Prof. G. Bhuvaneswari, IIT Delhi 3. Coursera - Introduction to Electronics, https://www.coursera.org/learn/electronics			
Model questions for theory external examination.				
MCQs for Internal Assessment	MCQs for Internal Assessment: 1) Equipment operating instructions are a) for new employee b) only guidelines c) specific steps to follow every time d) none of above. 2) The only step that keep you safe consistently is a) personal protective equipment			

	b) your supervisor c) obeying all warning signs d) your altitude e) not attempted 3) In which type of fault, zero sequence currents do not exist, a) lg, llg, lllg b) line- line to ground c) line to ground d) line to line 4) Which test is conducted by keeping the power supply on in power supply unit in troubleshooting of power supply unit? a) cold b) hot c) continuity d) impedance 5) Which material can be used up a temperature of 130 degree celcius a) mica b) cotton c) synthetic resin d) all of these.
Short answer questions	Short answer type: 1.What are the safety precautions in handling electrical appliances? 2. What are the 5 electrical safety rules? 3. How are appliances connected? 4. How do appliances work with electricity? 5 How do you test DC MCB? 6.How do you troubleshoot a power supply?
Long answer questions	Long answer type : 1.Explain working of half wave rectifier. 2.Draw block diagram of regulated power supply. 3.Explain Pins of IC 78XX,79XX. 4.How to trace connections from AC mains to Power supply? 5.What are safety signs used for?

GOEC-4 : For the students of Sem-II of the program of other than that of Science & technology faculty.

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Mark
4.5	II	113209	Computer Hardware and Maintenance	2	30	2 Hrs	30
Course Objectives:		- To introduce students to various peripherals of computers. - To make students acquainted with the electronic parts, and hardware & software tools. - To develop practical skills required for computers software maintenance. - To learn formatting, troubleshooting and proper maintenance of Computer systems.					
Course Outcomes:		- Identify software components, symbols & footprints - Demonstrate various input and output devices and their workings. - Apply practical knowledge and skills regarding software installations. - Maintenance and updating of system software. - Troubleshooting and proper maintenance of Computer systems.					
Unit System		Contents			Workload Allotted	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I		Fundamental of Computers Block diagram of computer system, need, features, characteristics; application areas of computers. Evolution of computers; Classifications of computer systems, Types of computers, types of processors block diagram, working, features, chipset, components			8 Hrs	8 Marks	While teaching Electronics as a complete subject, the suitable pedagogical strategies should be adapted. These strategies include both classical and contemporary innovations, for integration into the Teaching, Learning, and Evaluation processes. Technology based pedagogy should involve use of advance electronic tools, instruments, media and other available e-resources to enhance the students learning experience. This entails use of ICT tools to interact and work with students to
Unit II		Parts of Computer Computer Hardware, Software and Peripheral devices; Various Input and Output devices and their workings; Various Cables, Connectors and Ports on Motherboard, SMPS, connectors, slots, ports, classification of motherboard, concept of PCB, types of motherboards.			7 Hrs	7 Marks	
Unit III		Memory used in Computer Definition, features, types of memory, memory hierarchy; Primary memory: RAM, ROM; Concept of cache memory; Secondary memory: floppy disk, hard			8 Hrs	8 Marks	

	disk, CD, DVD, pen drive, memory card, external memory.			accomplish goals, objectives and outcomes effectively. Along with theoretical and practical teaching methods; enquiry based, problem based, project based, simulation based and field work based methods will be accepted to enhance comprehension of the course contents.
Unit IV	System Booting and Operating System Software Installations Booting process of computer system; Operating System and its functions; Various types of Operating System; Installation process of Operating System software. General purpose and Special purpose software's; Installation of programs and software's; Setting of Display, Sound and Control panel properties, Installation of MS Office, Antivirus, Printer and Peripheral software's.	7 Hrs	7 Marks	
References:	1. Computer Fundamentals, P. K. Sinha, BPB Publications, Sixth Edition. 2. Introduction to Information Technology, V. Rajaraman, PHI, Second Edition. 3. Fundamental of Information Technology, Chetan Shrivastava, Kalyani Publishers. 4. James Bernstein, "Building your own computer made easy: Step by step guide"; 2021 Edition. 5. How to build a PC: A step by step guide; Off the Bux, Kindle Edition -2023. 6. Stanislaw Jarzabek; Effective Software Maintenance and Evolution; 7. Thomas M. Pigoski; Practical Software Maintenance; Edition -1; Wiley Publications. 4. Scott Muellers; Upgrading and Repairing PCs; 22 nd Edition.			
Model questions for theory external examination.				
MCQs for Internal Assessment	MCQ for internal assessment 1. Any physical components of a computer system that we can see and touch is a) Software b) Peripheral device c) Hardware d) CPU 2. The System that contains the most vital part of the personal computer is called a) CPU b) BIOS chip c) Motherboard d) Monitor 3. Which of the following is called as the brain of the computer? a) Motherboard b) RAM c) CPU d) BIOS chip 4. Central processing unit in a computer consists of which major component? a) Arithmetic logic unit and control unit b) Control unit c) Registers d) ALU, control unit and Registers 5. Which of the following is not hardware? a) Processor chip b) Printer c) Mouse d) Java			

Short answer questions	Short answer type 1. What are the characteristics of computer? 2. Explain the features of microprocessor. 3. Explain the features of memory. 4. Characteristics of input devices. 5. What is printer? Explain its feature.
Long answer questions	Long answer type 1. What is computer? Draw and explain the block diagram of computer. 2. Draw the block diagram and explain the feature of microprocessor. 3. Differentiate between RAM and ROM Memory. 4. What is motherboard? Explain the different classification of motherboard. 5. Explain the concept of Concept of computer assembling and disassembling.

Vocational Skill Course 1: Lab/ Practical 4: Advanced Practical on Major Theory Semiconductor Devices

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Mark
4.5	II	113210	Advanced Practical on Major Theory 2	2	60	4 Hrs	50
Course Objectives:		• To reduce the unemployment by providing self- employment schemes. • To make the students skilled technician. • To reduce the mismatch between the demand and supply of skill man-power. • To develop attitudes, knowledge, and skills for entrepreneurship and self-employment.					
Course Outcomes:		After successful completion of the course, the students will be able to: • Apply their practical knowledge/ hands on training in the workplace. • It fulfills the demand of industry. • It develops skilled technician.					
Lab/ Practical 4		List of Experiments: (Design of following circuits on Bread Board.) 1. To study characteristics of LDR. 2. To study characteristics of LED. 3. To study characteristics of Photodiode. 4. To study characteristics of Phototransistor. 5. To study Photovoltaic cell. 6. To study UJT. 7. To study Zener diode characteristics. 8. To study line and load regulation using zener diode. 9. To study UJT as relaxation oscillator. 10. To calculate bandgap energy of LED. 11. Identification and Testing of Integrated circuits.					

Note :

- Students during lab hours shall have to perform at least 10 experiments, however students shall have to perform one experiment at the time of examination.
- **Mode of Examination: Internal (There is no External Examination)**

Skill Enhancement Course 1: Lab/ Practical 5: Skill Oriented Practical on Major- Electronics

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Mark
4.5	II	113211	Design & construction of Power supply	2	60	4 Hrs	50
Course Objectives:	This course aims at enabling students: • To provide working knowledge for the identification and testing of components. • To impart Comprehensive understanding of the fundamentals of electronic rectifier circuits. • To provide hands on experience for conceptual understanding of power supply circuits. • To provide knowledge of various electronics regulators and related components, ICs and equipments. • To provide the knowledge about designing, building and troubleshooting of various power supply circuits.						
Course Outcomes:	After learning the course, the students will be able to: • Demonstrate the testing and analysis of electronic components by performing different experiments. • Demonstrate input and output measurements by performing different experiments. • Demonstrate the working of various power supply circuits. • Design and analysis of various electronics regulators and related circuits. • Develop expertise in repair, assembly and designing single, dual and SMPS power supply.						
Unit System	Contents						
	Perform any 10 experiments from the following list. List of Experiments: 1. Identification and testing of various types of Diodes for short, open and rating specifications. 2. Identification and testing of various types of Transistors for short, open and rating specifications. 3. Identification and testing of various types of Transformers for short, open and rating specifications. 4. Testing of various diodes and transistors on the circuit board. 5. Construction and testing of Half-wave rectifier circuits. 6. Construction and testing of Full-wave rectifier circuits. 7. To study the Zener diode as a voltage regulator. 8. Construction and testing of Positive voltage regulator. 9. Construction and testing of Negative voltage regulator. 10. To calculate percentage Line regulation of regulated power supply. 11. To calculate percentage Load regulation of regulated power supply. 12. To design and construct variable voltage regulated power supply. 13. Tracing and fault finding of a given power supply. 14. To design and construct regulated voltage power supply using IC 317. 15. To study various modes of Switching Mode Power Supply (SMPS).						

Note: Mode of Examination: Internal (There is no External Examination)