



SYLLABUS

FOR

B. Sc. Electronic Science

DISCIPLINE SPECIFIC COURSE (DSC)

(Under Faculty of Science and Technology)

NATIONAL EDUCATION POLICY 2020 (REVISED)

TO BE IMPLEMENTED FROM

ACADEMIC YEAR 2024-25

DEPARTMENT OF ELECTRONIC SCIENCE

Maharashtra Education Society's

ABASAHEB GARWARE COLLEGE (AUTONOMOUS)

KARVE ROAD, PUNE 411 004.

Maharashtra Education Society's

Abasaheb Garware College, Pune

Credit Framework for Under Graduate (UG) to be implemented from 2024 – 25 to First Year UG

Level / Difficulty	Sem	Subject-1	Subject-2	Subject-3	GE/OE	SEC	IKS	AEC	VEC	CC	Total			
4.5 / 100	I	2 (T) + 2 (P)	2(T)+2(P)	2(T)+2 (P)	2 (1T+1P)	2 (T/P)	2 (T) (Generic)	2 (T)	2	--	22			
	II	2 (T) + 2 (P)	2(T)+2(P)	2(T)+2 (P)	2 (1T+1P)	2 (T/P)	--	2 (T)	2	2	22			
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor Continue option: Student will select one subject among the (subject 1, subject 2 and subject 3) as major and another as minor and third subject will be dropped.														
Level / Difficulty	Sem	Credits Related to Major				Minor	GE/OE	SEC	IKS	AEC	VEC	CC	Total	
		Major Core	Major Elective	VSC	FP / OJT/ CEP									
5.0 / 200	III	4 (T) + 2 (P)	--	2 (T/P)	2 (FP)	2(T)+2(P)	--	2 (1T+1P)	--	2 (T) (Major Subject Specific)	2 (T)	--	2	22
	IV	4 (T) + 2 (P)	--	2 (T/P)	2 (CEP)	2(T)+2(P)	--	2 (1T+1P)	2 (T/P)	--	2 (T)	--	2	22
Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor														
5.5 / 300	V	8(T)+4(P)	2 (T) + 2 (P)	2 (T/P)	2 (FP/CEP)	2(T)	--	--	--	--	--	--	--	22
	VI	8(T)+4(P)	2 (T) + 2 (P)	2 (T/P)	4 (OJT)	--	--	--	--	--	--	--	--	22
Total 3 Years		44	8	8	10	18	8	8	6	4	8	4	6	132
Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor														
6.0 / 400	VII	6 (T) + 4 (P)	2 (T) + 2 (T/P)	--	4 (RP)	4(RM)(T)	--	--	--	--	--	--	--	22
	VIII	6 (T) + 4 (P)	2 (T) + 2 (T/P)	--	8 (RP)	0	--	--	0	0	0	0	0	22
Total 4 Years		64	16	8	22	22	8	8	6	4	8	4	6	176
Four Year UG Honours with Research Degree in Major and Minor with 176 credits OR														
6.0 / 400	VII	10(T) + 4(P)	2 (T) + 2 (T/P)	0	0	4 (RM) (T)	--	--	0	0	0	0	0	22
	VIII	10(T) + 4(P)	2 (T) + 2 (T/P)	0	4 (OJT)	0	--	--	0	0	0	0	0	22
Total 4 Years		72	16	8	14	22	8	8	6	4	8	4	6	176
Four Year UG Honours Degree in Major and Minor with 176 credits														



[Signature]
18-4-24
Principal

MES, Abasaheb Garware College
Pune-4.

Notes:

Abbreviation: VSC: Vocational Skill Course, IKS: Indian Knowledge System, FP: Field Project, OJT: On Job Training, CEP: Community Engagement and Service, GE/OE: Generic Elective / Open Elective, SEC: Skill Enhancement Course, AEC: Ability Enhancement Course, VEC: Value Education Course, CC: Cocurricular Courses, T – Theory, P – Practical

1. VSC, FP/OJT/CEP should be related to the Major subject
2. OE is to be chosen compulsorily from faculty other than that of the Major.
3. SEC to be selected from the basket of Skill Courses approved by college.
4. Student has to choose three subjects from the same faculty in First Year and at the start of Second year he has to opt one subject as Major subject and one another subject as Minor subject and the last one subject will be dropped by the student. Therefore, the student after completion of three year will be awarded degree in Major and Minor subject.
5. Student cannot select a subject as major or minor other than the subjects taken in first year
6. Frame each course having even number of credits such as 2 or 4 credit.
7. This UG credit structure is applicable for all the programme across all faculties, except the programmes required approval from apex bodies like AICTE, PCI, BCI, COA, NCTE, etc.



Ugale
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Principal
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DEPARTMENT OF ELECTRONIC SCIENCE
CURRICULUM STRUCTURE UNDER NEP 2020
SEMESTERWISE TITLES FOR THE SUBJECT
THREE YEAR B.Sc. ELECTRONIC SCIENCE

MAJOR SUBJECT

YEAR	SEM	COURSE CODE	TITLE OF PAPER	THEORY/ PRACTICAL	CR
FIRST YEAR	1	ELS-111- TH	Basics of Electronic Circuits	THEORY	2
		ELS-112- PR	Electronic Science Practical Course I	PRACTICAL	2
	2	ELS-161- TH	Applications of Electronic Circuits	THEORY	2
		ELS-162- PR	Electronic Science Practical Course II	PRACTICAL	2
				TOTAL(FY) Core	8
	SEC OND YEA R	3	ELS-201- MJ	Basics of Communication Systems	THEORY
ELS-202- MJ			Introduction to Digital Signal Processing	THEORY+ PRACTICAL	2
ELS-205- MJP			Electronic Science Practical Course III	PRACTICAL	2
4		ELS-261- MJ	Electronic Instrumentation	THEORY	2
		ELS-262- MJ	Embedded System Design	THEORY+ PRACTICAL	2
		ELS-263- MJP	Electronic Science Practical course IV	PRACTICAL	2

				TOTAL(SY)	12
THIRD YEAR	5	ELS-304-MJ	Modern Communication Systems	THEORY	2
		ELS-305-MJ	Process control Systems	THEORY	2
		ELS-306-MJ	Industrial Electronics	THEORY	2
		ELS-307-MJ	PLC-SCADA	THEORY	2
		ELS-308-MJP	Electronic Science Practical Course V	PRACTICAL	2
		ELS-316-MJ	Robotics and Mechatronics	THEORY	2
		ELS-317-MJP	Practicals based on Robotics and Mechatronics	PRACTICAL	2
		ELS-318-MJ	Artificial Intelligence and Machine Learning	THEORY	2
		ELS-319-MJP	Practicals based on Artificial Intelligence and Machine Learning	PRACTICAL	2
		ELS-309-MJP	Electronic Science Practical course VI (project)	PRACTICAL	2s
	6	ELS-354-MJ	Digital system design using VHDL	THEORY	2
		ELS-355-MJ	Mechatronics	THEORY	2
		ELS-356-MJ	Process Control systems	THEORY	2
		ELS-357-MJ	Mobile and Satellite Communication	THEORY	2
		ELS-358-	Electronic Science Practical	PRACTICAL	2

		MJP	Course VII		
		ELS-359-MJP	Electronic Science Practical course VII (project)	PRACTICAL	2
		ELS-366-MJ	Digital Image Processing		
		ELS-367-MJP	Practical Course on Digital Image Processing		
		ELS-368-MJ	Photonics		
		ELS-369-MJP	Practical Course on Photonics		
				TOTAL(TY)	28
			TOTAL(MAJOR)		

OPEN ELECTIVE/GENERAL ELECTIVE COURSE

YEAR	SEM	COURSE CODE	TITLE OF PAPER	THEORY/PRACTICAL	CRE
FIRST YEAR	1	OE-111-ELS	Introduction to Technology	THEORY+PRACTICAL	2
	2	OE-161-ELS	Applications of Technology	THEORY+PRACTICAL	2
SECOND YEAR	3	OE-201-ELS	Introduction to Office Equipment's	THEORY+PRACTICAL	2
	4	OE-254-ELS	Introduction to Consumer Electronics	THEORY+PRACTICAL	2
			TOTAL(OE)		4

SKILL ENHANCEMENT COURSES

YEAR	SEM	COURSE CODE	TITLE OF PAPER	THEORY/ PRACTICAL	CREDITS
FIRST YEAR	1	SEC-102-ELS	Sensors and technology	THEORY+PRACTICAL	2
	2	SEC-152-ELS	Fundamentals of Agrielectronics and Medical Instrumentation	THEORY +PRACTICAL	2
SECOND YEAR	4	SEC-255-ELS	PCB Layout Design	THEORY +PRACTICAL	2
			TOTAL(SEC)		6

MINOR COURSE

YEAR	SEM	COURSE CODE	TITLE OF PAPER	THEORY/ PRACTICAL	CREDITS
SECOND YEAR	3	ELS-243-MN	Introduction of Electric Vehicles Systems	Theory	2
	3	ELS-244-MNP	Practical Course Based on Electronic Vehicle systems	Practical	2
	4	ELS-295-MN	Fundamentals of IoT	Theory	2
	4	ELS-296-MNP	Practical Course based on IoT	Practical	2
THIRD YEAR	5	ELS-341-MN	Embedded IoT and Edge computing	Theory	2
			TOTAL(Minor)		10

VOCATIONAL SKILL ENHANCEMENT COURSES

YEAR	SEM	COURSE CODE	TITLE OF PAPER	THEORY/ PRACTICAL	CREDITS
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SECOND YEAR	3	ELS-222-VSC	Fundamentals of Electronic Product Design	PRACTICAL	2
	4	ELS-275-VSC	Technical Skills for Electronic Product Design	PRACTICAL	2
THIRD YEAR	5	ELS-322-VSC	Product Prototype Design	PRACTICAL	2
	6	ELS-379-VSC	Industrial Product Design and Entrepreneurship	PRACTICAL	2
			TOTAL(VSC)		8

INDIAN KNOWLEDGE SYSTEM(SUBJECT SPECIFIC)

YEAR	SEM	COURSE CODE	TITLE OF PAPER	THEORY/ PRACTICAL	CREDITS
SECOND YEAR	3	ELS-200-IKS	Science and Technology in Ancient India	THEORY	2
			TOTAL(IKS)		2

**Maharashtra Education Society's
 ABASAHEB GARWARE COLLEGE (AUTONOMOUS)
 KARVE ROAD, PUNE 411 004.
 DEPARTMENT OF ELECTRONIC SCIENCE
 Discipline Specific Course System: Major**

Level: 4.5/100	Year : First	Semester: 1
Paper: I	Compulsory Theory Major	Credits: 2
Course code: ELS-111-TH	Course title: Basic of Electronic Circuits	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

Course Outcomes: After completion of this course student is able to

- CO1: Identify basic elements and systems used in analog and digital circuits
 CO2: know fundamental laws and elements of electrical circuits
 CO3: Understand DC circuit theorems and networks
 CO4: Understand AC circuits and related terminologies with examples
 CO5: Understand fundamentals of digital circuit design

Unit	Topics	Lectures	CO MAPPING
0	Fundamental Course(to be taught in the initial lectures) <i>Introduction to basic electronic components and related concepts, Introduction to logic gates and related concepts, Number Systems and conversions</i>	8	CO 1
I	Basic Circuit concepts and Network Laws: Voltage and current sources, Kirchhoff's current law, Kirchhoff's voltage law Network Theorems: Thevenin Theorem, Norton Theorem, Maximum Power Transfer Theorem, Superposition Theorems Problem solving based on network theorems Basic electronic Circuits: RC circuit, RL circuit, Concept of time constant, RL and RC circuits with sources, DC response of series RLC circuit, Applications circuits related to concepts AC analysis: Sinusoidal voltage and current, Definition of instantaneous, Peak to peak, Root mean square and average values. Voltage and current relationship of resistor, inductor and capacitor. Problem solving and calculations based on these concepts	15	CO1 CO2

II	Basic Concept of Digital Electronics: Basic concept of SOP and POS. K maps, Use of K maps using suitable examples. Introduction to combinational and sequential circuits(Concept) Circuits using basic logic gates(digital lock, magnitude comparator, parity generator checker) Introduction to half adder and full adder, Multiplexer and demultiplexer , encoder and decoder Related application circuits	15	CO1, CO 5
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Suggested books:

1. Robert Boylestad, Essentials of Circuit Analysis
 2. M. Morris Mano Digital System Design, Pearson Education Asia,(Fourth Edition)
 3. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
 4. W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)
 5. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)
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DEPARTMENT OF ELECTRONIC SCIENCE
Discipline Specific Course System: Major**

Level: 4.5/100	Year :First	Semester: 1
Paper: 2	Compulsory Practical Major	Credits: 2
Course code: ELS-112-PR	Course title: Electronic Science Practical Course 1	
Number of hours per practical: 4	Internal assessment: 25 Marks	Semester assessment: 25 marks

Course Outcomes: After completion of this course, students will be able to

CO1 : identify the basic electronic components and circuits

CO2: identify and use test and measuring instruments in lab

CO3: Understand and design simple digital systems.

CO4: Able to connect and test the circuits

CO 5: Build and test application circuits

CO6: Prepare the technical report on the experiments carried

List of experiments (any 10)

1. Introduction to electronic components and instruments (CO 1)
 - a. Resistance in series, parallel and series-Parallel
 - b. Capacitors & Inductors in series & Parallel.
 - c. Multimeter – Checking of components. (CO2)
 - d. Getting familiar with basic digital ICs
 2. Measurement of Amplitude, Frequency & Phase difference using CRO. (CO2)
 3. Verification of Kirchoff's current Law. (CO 4)
 4. Verification of Kirchoff's current Law. (CO 4)
 5. Verification of Thevenin's Theorem . (CO 4)
 6. Verification of the Maximum Power Transfer Theorem. (CO 4)
 7. RC Circuits: Time Constant, Differentiator, Integrator. (CO 5)
 8. To study of basic gates (CO 3)
 9. To verify and design AND, OR, NOT and XOR gates using NAND gates. (CO 3)
 10. To interconvert convert a Boolean expression into logic gate circuit and assemble it using logic gate IC's. (CO4)
 11. To design, build and test simple Applications Circuits: Half adder/full adder/mux/demux/encoder/decoder (CO 5)
 - 12-15. Activity: Students can perform Project/Industrial visit. This will be equivalent to two experiments./Virtual Laboratory experiment (CO1-CO6)
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 Discipline Specific Course System: Major**

Level:4.5/100	Year :First	Semester: 2
Paper: 3	Compulsory Theory Major	Credits: 2
Course code: ELS-161-TH	Course title: Applications of Electronic Circuits	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

Course Outcomes: After completion of this course student is able to

CO1: to understand basics of semiconductor devices.

CO2: know about behaviour of semiconductor devices and their applications

CO3: understand basics sequential logic circuits and their applications

CO4: get familiar with applications of various circuits in day to day life

CO5: get knowledge about the interconnection of analog and digital electronics

Unit	Topics	Lectures	CO mapping
0	<i>Fundamental Course(to be taught initial lectures): Concept of conductor, insulator and semiconductor, intrinsic and extrinsic semiconductor</i>	8	CO1
I	<p>Semiconductor Basics: P-N Junction: Symbol, pins, unbiased diode, depletion layer, barrier potential ,working of forward and reverse bias diode, I-V characteristics, Diode equation, Types of Diodes. Rectifier circuits, Concept of LED, LED circuits and applications, Photodiode concept and circuits</p> <p>Bipolar Junction Transistor(BJT) Symbol, pins, types: PNP and NPN, concept of gain, beta and alpha of transistor, CE, CC and CB configuration, I-V characteristics of CE configuration , BJT as Amplifier and switch, Use of BJT in digital logic gates(TTL), Phototransistor circuits</p> <p>JFET ,MOSFET and UJT: Symbol, pins, construction, types , working principle I-V characteristics, specification parameters of UJT, JFET and MOSFET, MOSFET as switch, use in CMOS logic family</p>	15	CO1, CO2 CO 3

II	Basics of Sequential circuits Fundamentals of sequential circuits, concept of truth table, state table and excitation table, Flip flops using gates and ICs, concept of edge triggered and level triggered Flip flops SR FF, D FF, TFF and JK FF(Schematic diagram and truth table) Application circuits using flip flop. Concept of counter, Up and down counter circuits using flip flops and ICs, application circuits using counters Introduction to VHDL	15	CO3, CO 4 CO5
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Suggested Books:

1. M. Morris Mano Digital System Design, Pearson Education Asia,(Fourth Edition)
 2. 2. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
 3. W. H. Gothmann, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India(2000)
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DEPARTMENT OF ELECTRONIC SCIENCE**

Discipline Specific Course System: Major

Level: 4.5/100	Year :First	Semester: 2
Paper: 4	Compulsory Practical Major	Credits: 2
Course code: ELS-162-PR	Course title: Electronic Science Practical Course 2	
Number of hours per practical: 4	Internal assessment: 25 Marks	Semester assessment: 25 marks

Course Outcomes: After completion of this course, students will be able to
CO1 : Understand basic characteristics of various semiconductor devices
CO2: Verify behaviour of various digital sequential circuits
CO3: Study application circuits in day to day life
CO4: experience the self learning skills

List of experiments (any 10)

1. Study of the I-V Characteristics of Diode – Ordinary and Zener Diode. CO1
 2. Study of the I-V Characteristics of the CE configuration of BJT CO1
 3. Study of the I-V Characteristics of the UJT/ JFET/MOSFET. CO1
 4. Study of half wave, full wave and bridge rectifier CO3
 5. Study of 5V/9V power supply CO3
 6. Verification of truth tables of FFs and their applicationsCO3
 7. Verification of truth tables of counters and their application as event counterCO3
 8. Smoke detector circuit/fire alarm detector circuitCO3
 9. Liquid level detectorCO3
 10. Digital lockCO3
 11. Digital clock using nand gatesCO3
 12. Activity: Students can perform Project/Industrial visit. This will be equivalent to two experiments./Virtual Laboratory experiment CO4
 13. Assignment: Introduction to logic familiesCO4
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 DEPARTMENT OF ELECTRONIC SCIENCE
 Discipline Specific Course System: Open Elective(OE 1.1)**

Level: 4.5/100	Year :First	Semester: 1
Paper: OE1.1	Theory Open Elective Course	Credits: 1
Course code: OE-111-ELS	Course title: Introduction to Technology	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

Course Outcomes:

At the end of this course, student will be able to

CO1: get familiar with basics of computer blocks

CO2: get knowledge of typing skills using google tools

CO3: use tools in Microsoft word

CO4: use tools in Microsoft Excel

CO5: use tools in Microsoft Power point

Unit	Topics	Lectures
I	Basic computer fundamentals: Introduction and working of parts of computer/laptop, computer and laptop accessories: Headphone, mouse , keyboard and webcam, connecting laptop to projector Introduction to Microsoft Office: MS Word: Creating document, Saving, Editing, Printing, use of smart tools in MS word, mailmerge MS Excel: Concept of spreadsheet, creating spreadsheet, saving printing and use of various tools and formulae in excel, plotting graphs etc MS Power point: concept and need of presentation, rules of preparing PPT, tools in powerpoint, slideshow, animation etc	15

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DEPARTMENT OF ELECTRONIC SCIENCE
Discipline Specific Course System: Open Elective(OE 1.1)**

Level: Certificate	Year :First	Semester: 1
Paper: OE1.1	Practical Open Elective Course	Credits: 1
Course code: OE-111-ELS	Course title: Practicals on Introduction to Technology	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

List of Experiments

1. Smart typing skills
 2. Using gmail and its features
 3. Using smart phone and interfacing with different gadgets
 4. Creating google forms,google sheets, google docs,google maps
 6. Demonstration of how to use different apps
 7. Practicals based on MS Word
 8. Practicals based on MS Excel
 9. PPT presentation using MS Power point
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Discipline Specific Course System: Open Elective(OE 1.2)

Level: Certificate	Year :First	Semester: 1
Paper: OE1.2	Theory Open Elective Course	Credits: 1
Course code: OE-161-ELS	Course title: Applications of technology	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

Course Outcomes:

At the end of this course, student will be able to

CO1: get familiar with google tools

CO2: build google forms

CO3: build google spreadsheets

CO4: build and create google classroom and related features

CO5: build google documents

Unit	Topics	Lectures
I	Introduction to various google tools: Gmail, google classroom, google forms, google spreadsheet, google documents Effective use of tools: Feedback forms using google forms Sharable google spreadsheet Google typing tools Google docs sharing and conversions from speech to text Creating google classroom Creating gmeet lin and related tools	15

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Discipline Specific Course System: Open Elective(OE 1.2)

Level: Certificate	Year :First	Semester: 1
Paper: OE1.2	Practical Open Elective Course	Credits: 1
Course code: OE-161-ELS	Course title: Practical course on Applications of Technology	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

List of experiments:

1. Practicals based on google docs
 2. Preparation google forms for specific applications
 3. Preparation of sharable google spreadsheet for applications
 4. Preparation google powerpoint and its features
 5. Use of google typing tools
 6. Creating google classrooms
 7. Creating google meets and related settings
 8. Activity
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DEPARTMENT OF ELECTRONIC SCIENCE

Discipline Specific Course System: Skill Enhancement Course(SEC 1.2)

Level: 4.5/100	Year :First	Semester: 1
Paper: SEC1.2	Skill Enhancement Course	Credits: (1 Theory + 1 Practical)
Course code: SEC-102-ELS	Course title: Sensors and technology	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

Unit	Topics	Lectures
Theory	<p>A) Basics of biological and physical sciences Origin of Bio-potentials, Electrical Activity of Cells, Electrode - Electrolyte interface, Half cell potential, Polarization - polarizable and non - polarizable electrodes, Ag /AgCl electrodes Biomedical Sensors - Electrodes for biomedical sensing, Electrode and electrode interface, polarization, Electrode behavior and circuit model, Electrode skin interface, Body surface electrodes, internal electrodes, Microelectrodes, electrode arrays</p>	15
Practical	<ol style="list-style-type: none"> 1. Study of Optics in microscopes, 2. Study of Sensors in pH meter, 3. Study of Temperature and pressure measurement, 4. Study of Humidity , soil moisture and npk measurement sensors, Study of Technology in polyhouse/green house system, 5. Study of colorometry, 6. Study of UV spectrophotometer, 7. Study of Remote sensing, 8. Study of centrifuge machines 9. Study of Introduction to Digital Image processing and analysis 	Any 6 expts

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DEPARTMENT OF ELECTRONIC SCIENCE
Discipline Specific Course System: Skill Enhancement Course(SEC 1.2)

Level: 4.5/100	Year :First	Semester: 2
Paper: SEC1.2	Skill Enhancement Course	Credits: (1 Theory + 1 Practical)
Course code: SEC-152-ELS	Course title: Fundamentals of Agrielectronics and Medical Instrumentation	
Number of lectures: 30	Internal assessment: 25 marks	Semester assessment: 25 marks

Unit	Topics	Lectures
Theory	<p>Measurement, Monitoring and recording systems - Foetal heart rate measurements, Cardiac Pacemakers, Defibrillators, Heart - Lung Machine (HLM), Cardiac Measurement - Cardiovascular System, Heart Structure, Cardiac Cycle, ECG Theory, ECG Electrodes, ECG amplifier, Electrocardiograph, Measurement of continuous Cardiac output derived from aortic pressure waveforms - Different Types of ECG Monitors, Ambulatory monitoring Instruments, Measurement of heart rate, Blood pressure, Temperature, Respiration rate, Computerized patient monitoring system , Pulmonary Function Analyzers - Natural Process of Breathing, O₂ and CO₂ Transport, Regulation of Breathing, Ventilators, Pulmonary function measurement, Spirometry, Pulmonary function analyzers, Respiratory gas analyzers</p> <p>Blood flow meters - Electromagnetic, Ultrasonic, NMR, Laser Doppler Blood Flow Meters Methods of Cell counting - Coulter Counters, Automatic recognition and differential counting of cells, Auto analyzer</p> <p>B) Significance of Electrical Safety –</p> <p>Physiological effects of electrical current, Shock Hazards from electrical equipment and methods of accident prevention</p>	15

Practical	<ol style="list-style-type: none">1. Study of Optics in microscopes,2. Study of Sensors in pH meter,3. Study of Temperature and pressure measurement,4. Study of Humidity , soil moisture and npk measurement sensors, Study of Technology in polyhouse/green house system,5. Study of colorometry,6. Study of UV spectrophotometer,7. Study of Remote sensing,8. Study of centrifuge machines9. Study of Introduction to Digital Image processing and analysis	Any 6 expts
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