NOTIFICATION

No. 123 /2023. Date : 17/8/2023.

Subject : Implementation of revised syllabus ofB.Sc. Semester- I & II of the subject Electronics under CBCS Pattern.

It is notified for general information of all the concerned that, the authorities of the University have accepted the revised syllabi of B.Sc Part-I (Semester – I & II)forthe subject 1S & 2S – Electronics which is to be implemented from the Academic Session 2023-2024 under Choice Based Credit System appended herewith as Appendix-A.

Sd/-
(Dr. Tushar Deshmukh)
Registrar,
Sant Gadge Baba Amravati University

Appendix-A

Faculty of Science and Technology

Programme: B.Sc. Electronics Science

Program Outcomes (POs):

At the end of the programme, students would be able to

1) Utilize the basic knowledge in Electronics science.

2) Identify electronic components and ICs.

3) Design systemc omponents that meet the requirement of public safety and offer solutions to the societal and environmental concerns

4) Apply research based knowledge to design and conduct experiments

5) Construct, choose and apply the techniques, resources and modern electronics tools required for Electronics applications.

6) Apply the contextual knowledge to as sesssocietal, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional electronics practice.

7) Examine the impact of electronics solutions in global and environment alcon text and utilize the knowledge for sustained development.

8) Develop consciousness of professional, ethical and social responsibilities as experts in the field of Electronics and Communication.

9) Perform effectively as a member / leader in multidisciplinary teams.

10) Demonstrat ere source fulness for contemporary issues and lifelong learning.

Program Specific Outcomes:

Upon completion o fthe programmes uccessfully, students would be ableto

1. acquireknowledge in fund a mental as pects of all branches of Electronics
2. create in quisitivenessandproblem-solvingskills
3. apply the principles of Electronics in solutions to real world problems
4. get prepared for higher education and career in Electronics
5. developskillsintheproperhandlingofapparatusandcomponents
6. applyElectronicsintheirdaytodaylife
7. actasaresponsiblecitizen
8. Select and apply cutting-edge engineering hardware and software tools to solve complex Electronics and Communication Engineering problems
9. Apply the fundamental concept so felectronics and communication science to design a variety of components.

Employ ability Potential in Electronics:

Bachelor of Science in Electronics is a technical course comprising the study of electronic devices, the materialsused in the manufacturing and production of these devices and their composition. A degree in electronics cangive you the skills and knowledge to understand the various features of electronic devices and circuits and how they function. Course is Divided across six semesters, the course may include subjects such as basic mathematics, the fundamentals of electricity, electronics and electronic communication, physics, environmental studies and value education. Depending on the college and its syllabus, students can also pick other elective subjects such as Mathematics, Physics, Computers, Statistics etc.

1. Field service engineer
2. Electrical technician
3. Sound technician
4. Telecommunication sengineer
5. Technical support executive
6. Electronic sales manager
7. Electrical supervisor
8. Software test engineer
9. Softwar eengineer
10. Automation engineer

Areasofemploymentincludebutnot limitedto:

- IT companies
- Hardware manufacturing industry
- Telecommunication industry
- Defensesector
- Banking sector
- Tourism industry

Further studies after B.Sc. in Electronics

- M.Sc.(Master of Science) in Electronics Instrumentation
- M.Sc.(Master of Science) in Applied Electronics
- M.Tech.(Masterof Technology) Electronics and communication
- Ph. D in Electronics Science
- Diploma in Bio-Medical Electronics
- Diploma in Mechatronics

KeyskillsrequiredforjobsafterB.Sc.inElectronics

A bachelor's degree in electronics can lead you to job opportunities in both the public and private sectors. Apartfrom the technical knowledge and skills that you may gain during the course of your professional degree, graduates in electronics may requires of skills to excel, regardless of the industry or field the ychoose to workin. Some of these soft skills include:

- problem- solvings kills
- methodical thinking
- critical thinking
- communications kills
- time management skills
- ability to plan and priorities work
- leadership skills
- dependability
- ability to work inateam
- adaptability
- good work ethics

Semester I
DSC -1S- Electronics (CBCS)
Course Title - Basic Electronics

Unit I : Passive Components and Network theorems (15L)

Introduction to Resistors, Capacitors, Inductors and Transformers, Concept of ideal dc voltage and current source, KVL, KCL, Thevenin's, Norton's, maximum powertransfer, Millman's theorem (statement, proof, simple numerical application for dc only).

UNIT II: Measuring Instruments : (15L)

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.)

Unit III : Semiconductor Diode and Regulated power supply: (15L)

Operation and characteristics of PN junction diode, Avalanche and Zener breakdown mechanism, Half wave and full wave rectifiers (ripple factor, efficiency, PIV ratings), C, L and p filters, Concept of unregulated and regulated power supply, Zener diode voltage regulator, Three terminal IC regulator.

Unit IV : Bipolar Transistors: (15L)

NPN and PNP transistor (construction and working) CB, CE & CC configuration, leakage currents, Input and output characteristics of CE mode, relation between a and b Load line and operating point, Amplification action of CE amplifier, biasing and stability, Self and fixed bias circuit.

Unit V : Switching and Optoelectronic devices : (15L)

Construction, working and characteristics of FET, MOSFET, UJT, SCR, relation of FET parameters, Construction, working & characteristics of LDR, LED, photodiode, photovoltaic cell(Solar cell).

Unit VI : DSC-1S-SEM (15L)

- Identification of testing tools.
- Idea of Phase, Neutral and Ground of AC mains.
- Useof soldering iron.
- Useof Desoldering pump.
- Identification of Active and Passive electronic components in simple way.
- Identification of step-up and step down transformer.
- Measurement of voltage.
- Measurement of current.
- Measurementof resistance.
- Identify and measurement of capacitance of various capacitors.
- Identify the control and functional switches in CRO .
- Study of Resistors and Capacitors in series.
- Study of Resistors and Capacitors in parallel.
- Testing and fault finding of transistor.

PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES
DSC-1S

Sr.No.	Topic	What the student will be able to do at the end of Module/Unit (Knowledge/ Skill achieved OR Application of Knowledge /Skill to do what)
1	**Unit I : Passive Components and Network theorems** Introduction to Resistors, Capacitors, Inductors and Transformers, 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).	At the end of this unit, students will be able to know passive and active components, analysis and verification of network theorems with numericals. Also students will be able to select and identify eletronic components such as resistors capacitors etc. of required value.
2	**UNIT II: 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.)	After this unit, students will be able to understand principle and working of different meters and CRO . They will be able to handle and connect the measuring instruments such as Voltmeter, Ammeter etc. at approprite place

3	**Unit III : Semiconductor Diode and Regulated power supply:** Operation and characteristics of PN junction diode, Avalanche and Zener breakdown mechanism, Half wave and full wave rectifiers (ripple factor, efficiency, PIV ratings), C, L and filters, Concept of unregulated and regulated power supply, Zener diode voltage regulator, Three terminal IC regulator.	At the end of this unit, students will be able to know function of diodes, rectifiers and voltage regulators. They will be able to design simple dc power supply.
4	**Unit IV : Bipolar Transistors:** NPN and PNP transistor (construction and working) CB, CE & CC configuration, leakage currents, Input and output characteristics of CE mode, relation between and Load line and operating point, Amplification action of CE amplifier, biasing and stability, Self and fixed bias circuit.	After completion of this unit, students will be able to know types transistor and their working in different modes, amplification and biasing, faults detection in eletronic circuits. Also they will be able to design and construct simple amplifiers.
5	**Unit V : Switching and Optoelectronic devices :** Construction, working and characteristics of FET, MOSFET, UJT, SCR, relation of FET parameters, Construction, working & characteristics of LDR, LED, photodiode, photovoltaic cell(Solar cell). concept of Embedded systems.	At the end of this unit, students will be able to know Switching and Optoelectronic devices and their working. They will be able to use these active devices for many applications.

Books Recommended:

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

Practicals: Minimum Ten experiments at least one on each of the followingaspects.

1. Active and Passive components.
2. Network theorems, voltmeter, Ammeter, ohmmeter multimeter andCRO.
3. Regulated power supply, rectifiers, filters, IC regulaters.
4. Bi-polar devices and its applications.
5. Uni-polar and optoelectronic devices and its applications.
6. IC testing, IC know how, IC connection, simple IC circuits, mountingof IC on PCB and checking of voltage at each pin.

Semester II

DSC -2S- Electronics (CBCS)

Course Title - Digital Electronics

Unit I : Binary Arithmetic & Logic gates : (15L)

Binary,Octal & Hexadecimal number system and their interconversion**,**Binary arithmetic (addition and subtraction using1's & 2's compliment), multiplication & division. Binary codes: 8421 BCD, Excess-3 & Gray code.NOT, OR, AND, NAND, NOR gates (definition and truthtable). EXNOR & EXOR gates, Half adder, full adder , 4 bitbinary full adder.

Unit II : Boolean Algebra & Logic families: (15L)

Boolean laws, De-morgans theorem, Simplification of Booleanequations using Boolean algebra, Fundamental products &sum terms, K-map (K-map upto 4 variable).Classification of logic families, characteristics (Fan-in, Fanout,Noise immunity, Propogation delay, Power dissipation),DTL,TTL& CMOS logic.

Unit III :Multivibrators and Flip Flops: (15L)

Construction & working of Astable, Monostable and Bistable transistorized multivibrators, RS, CK-RS, D, JK, JKMS andT Flip Flops (Logic diagram, Truth table, construction &
working), Concept of edge trigger Flip-Flop, Concept of preset& clear terminal.

Unit IV : Counters and Shift registers: (15L)

Asynchronous & synchronous Counters, Up-down counters(up to 4-bits), Modified asynchronous counter.Types of shift registers, SISO, SIPO, PISO & PIPO, (Construction & working), Application of shift register.Ring counter, Johnson's counter.

UNIT V: Combinational Logic Circuit and Semiconductor Memories: (15L)

Encoder: Binary to BCD, Decimal to BCD, Decoder: 2 to 4 line, BCD to 7 segment, Multiplexer: 4X1, De multiplexer: 1X4.

Concept of memory, Primary and Secondary memory, Classification of memories, volatile and non volatile memories,memory Hierarchy, Semiconductor memory: RAM, ROM,PROM, EPROM, EEPROM, Flash memory.

Unit VI : DSC-2S-SEM (15L)

- Illustrate to practice the digital trainer kit with safety.
- Identify various digital ICs.
- To test IC using digital IC tester.
- Identification of ICs NOT, OR and AND.
- Identification of ICs NAND,NOR,EXNOR and EXOR.
- Skill to convert decimal number in to binary by using 8421 BCD code.
- Skill to convert the given number into the specified number system.
- Identification of base or radix of Binary, Octal, Decimal and Hexadecimal number system.
- Construct and verify the truth table of all gates using NOR and NAND gates.
- Skill of Subtraction by using 1s compliment.
- Skill of Subtraction by using 2s compliment.
- Construct an adder cum substractor circuits and verify the truth table.
- Study of Boolean algebra.
- Study of De-Morgans theorem.
- Study Characteristics of logic families Noise margin, Power dissipation, Figure of merit, Fan in and Fan out.
- Skill the K-map reduction technique for the Boolean expression.
- Study of IC 7483 adder.
- Construct Encoder and Decoder by using IC74147,IC7447 and verify the truth table.
- Construct multiplexer and demultiplexer circuits and verify the truth table.
- Triggering methods- edge trigger and level trigger.
- Construct and verify Asynchronous, Synchronous and Up-Down counter.
- Construct and verify the truth table of SR Flip Flop, Clocked SRFF with preset and clear.
- Construct and verify shift registers SISO, SIPO, PISO and PIPO.
- Identification of primary memory.
- Identification of secondary memory.

PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES

DSC-2S

Sr.No.	Topic	What the student will be able to do at the end of Module/Unit (Knowledge/ Skill achieved OR Application of Knowledge /Skill to do what)
1	**Unit I : Binary Arithmetic & Logic gates :** Binary, Octal & Hexadecimal number system and their inter- conversion, Binary arithmetic (addition and subtraction using 1's & 2's compliment), multiplication & division. Binary codes : 8421 BCD, Excess-3 &Gray code. NOT, OR, AND, NAND, NOR gates (definition and truth table). EXNOR & EXOR gates, Half adder, full adder , 4 bit binary full adder.	After completion of this unit, students will be able to know number systems and binary codes, their interconvertion and arithmetic,logicgates,use of logic gates in adders. They will be able to design and construct logic circuits using logic gates.
2	**Unit II : Boolean Algebra & Logic families**: Boolean laws, De-morgans theorem, Simplification of Boolean equations using Boolean algebra, Fundamental products & sum terms, K-map (K-map upto 4 variable). Classification of logic families, characteristics (Fan-in, Fan- out,Noise immunity, Propogation delay, Power dissipation), DTL,TTL & CMOS logic.	At the end of this unit, students will be able to understand Boolean algebra, De'Morgan's theorem, logic equations, K-map and logic families like DTL,TTL etc. They will be able to minimise logic equation, design and construct logic circuits using logic gates.

3	**Unit III : Multivibrators and Flip Flops**: Construction & working of Astable, monostable and Bistable transistorised multivibrators, RS, CK-RS, D, JK, JKMS and T Flip Flops (Logic diagram, Truth table, construction & working), Concept of edge trigger Flip-Flop, Concept of preset& clear terminal.	At the end of this unit, students will be able to know contruction and working of multivibrators and flip-flops. Also they will be able to design and construct different types of flip-flops using logic gates.
4	**Unit IV : Counters and Shift registers:** Asynchronous & synchronous Counters, Up-down counters(up to 4-bits), Modified asynchronous counter.Types of shift registers, SISO, SIPO, PISO & PIPO, (Construction & working), Application of shift register.Ring counter, Johnson's counter.	At the end of this unit, students will be able to know Construction & working of Astable, monostable and Bistable transistorised multivibrators, RS, CK-RS, D, JK, JKMS and T Flip Flops (Logic diagram, Truth table, construction & working), Concept of edge trigger Flip-Flop, Concept of preset& clear terminal.
5	**UNIT V: Combinational Logic Circuit and Semiconductor Memories:** Encoder: Binary to BCD, Decimal to BCD, Decoder: 2 to 4 line, BCD to 7 segment, Multiplexer: 4X1, De multiplexer: 1X4. Concept of memory, Primary and Secondary memory, Classification of memories, volatile and non volatile memories,memory Hierarchy, Semiconductor memory: RAM, ROM,PROM, EPROM, EEPROM, Flash memory.	At the end of this unit, students will be able to know Encoder: Binary to BCD, Decimal to BCD, Decoder: 2 to 4 line, BCD to 7 segment, Multiplexer: 4X1, De multiplexer: 1X4. Concept of memory, Primary and Secondary memory, Classification of memories, volatile and non volatile memories,memory Hierarchy, Semiconductor memory: RAM, ROM,PROM, EPROM, EEPROM, Flash memory.

Books Recommended:

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. Advance Digital Electronics, Microprocessor and 8051 Microcontroller by Dr Y.B.Gandole, Dr.D.S.Dhote and Dr.S.P.Yawale (G.C.Publishers, Nagpur)

Practicals: Minimum Ten experiments at least one on each of thefollowing aspects.

1. Half adder, full adder, code converter, Identification andverification of logic gates, 4-bit binary full adder(IC versions)
2. De'Morgan's theorems, K-map, TTL and CMOS logic, knowingcharacteristics of logic families.
3. Transistorized Astable, Bistable and monostablemultivibrator, JKand JKMS flipflops, Data Flipflop, RS , CK RS Flipflop.
4. 4-bit binary counter, modifying counter, ring and Johnson'sCounters (Using ICs), SISO, SIPO, PISO and PIPO.
5. Decoder, multiplexer, IC74147 mounting and testing.
6. Study of memories.

General Interest Course (GIC-1)(Level: B.Sc.I)

CalibrationandEquipmentMaintenanceTechniques

TotalHours: 30 **Credits: 02**

Description: This GIC is about the medical Equipment Technician to calibrate and help in equipmentmaintenance.

Scope: Thisunitscoversthefollowing:

- Calibratingandhelpinginequipmentmaintenance.

PerformanceCriterion:

Tobecompetent, theuser/individualonthejobmustbeableto:

- Testandcalibratepartsand equipment
- Calibratedequipmentaccordingtothemanufacturer'srecommendations,studyprotocols.
- Maintaincalibrationrecordfortheequipment.
- Maintainthecalibrationsheetforinspectionbytheregulatoryauthoritiesandotherrelevantauthorities.
- Helpinequipmentmaintenance.
- Keeprecordsof maintenanceand repairs.

KnowledgeandUnderstanding:

Theuser/individualonthejobneedstoknowand understand:

- Relevantlegislation,standards,policiesandproceduresfollowedbytheprovider.
- How to follow established protocols as defined in organization's policy while keeping and maintainingmedicalrecords.

TechnicalKnowledge

Theuser/individualonthejob mustbeableto:

- Testtheequipment.
- Calibratetheequipment.
- Recordcalibrationonrelevantsheet.
- Reviewtechnicalmanualsandregularlyattendtrainingsessions.
- Explainanddemonstratecorrectoperationsofmedicalequipment.

CoreSkills/GenericSkills:

WritingSkills:

Theuser/individualonthejobneedstoknowandunderstand howto:

- Useeffectivewrittencommunicationprotocols.
- Communicateinformation(forexample,facts,ideasormessages)inbrief,clearandorganizedmanner.
- Produce written information, which may include technical material, that is appropriate for intendedaudience.

ReadingSkills:

Theuser/individualon thejob needsto:

- Understand and interpret written material, including technical materials, rules, regulations, instructions,reports, charts,graphsortables.

Problem Solving:

Theuser/individualon thejob needsto:

- Detectthefaultandtakecorrectivemeasures.

AnalyticalThinking:

Theuser/individualon thejob needstoknowandunderstand howto:

- Analyzeinformationanduselogictoaddresswork-relatedissuesandproblems.

CriticalThinking:

Theuser/individualon thejobneedstoknowand understandhowto:

- Analyze, evaluate and apply the information gathered from observation, experience, reasoning orcommunication toact efficiently.
- Demonstrate the ability to adapt to rapidly changing situations, e.g.: responds appropriately to criticalsituations,retainscomposureinstressfulsituations, appliesexisting skillstonewsituations.

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