ST. JOSEPH'S DEGREE & PG COLLEGE

(Autonomous), Affiliated to Osmania University
Re-accredited by NAAC (3rd Cycle) with B++ grade
King Koti Road, Hyderabad
B. Sc (MECs)
Electronics Course Structure

Paper Code	Paper	Instruction Hours/week	Credits	Total Hours
CA-1-EL-22T	**I Year / Semester I: Paper – 1 –DSC** Circuit Analysis (Theory)	4hrs/ Week	4	60 Hrs
CA-1-EL-22P	**I Year / Semester I: Paper – 1 - DSC** Circuit Analysis (Practical)	3hrs/ Week	1	45 Hrs
EDC-2-EL-22T	**I Year /Semester II: Paper - 2 - DSC** Electronic Devices & Circuits (Theory)	4hrs/ Week	4	60 Hrs
EDC-2-EL-22P	**I Year / Semester II: Paper - 2 - DSC** Electronic Devices & Circuits (Practical)	3hrs/ Week	1	45 Hrs
AC-3-EL-22T	**II Year / Semester III: Paper –3 - DSC** Analog Circuits (Theory)	4hrs/ Week	4	60 Hrs
AC-3-EL-22P	**II Year / Semester III: Paper –3 - DSC** Analog Circuits (Practical)	3hrs/ Week	1	45 Hrs
LIC-4-EL-22T	**II Year / Semester IV: Paper – 4 - DSC** Linear Integrated Circuits & Basic Communication Electronics. (Theory)	4hrs/ Week	4	60 Hrs
LIC-4-EL-22P	**II Year / Semester IV: Paper – 4 - DSC** Linear Integrated Circuits & Basic Communication Electronics. (Practical)	3hrs/ Week	1	45 Hrs
DE-5-EL-22T EI-5-EL-22T	**III Year / Semester V: Paper – 5 - DSE** A. Digital Electronics and basics of VHDL (Theory) B. Electronic Instrumentation (Theory)	4hrs/ Week	4	60 Hrs
DE-5-EL-22P EI-5-EL-22P	**III Year / Semester V: Paper – 5 - DSE** A. Digital Electronics and basics of VHDL (Practical) B. Electronic Instrumentation (Practical)	3hrs/ Week	1	45 Hrs

EDL-5-EL-22T CHN-5EL-22T	**III Year / Semester V: Paper – 6 - GE** 1. Electronics in daily life (Theory) 2. Computer Hardware Electronics & Networks (Theory)	4hrs/ Week	4	45 Hrs
IOT-5-EL-22T BVD-5-EL-22T	**III Year / Semester V: Paper–SEC-3** A. Internet of Things (IOT) B. Basic VLSI design	2hrs/ Week	2	30 Hrs
MC-6-EL-22T DC-6-EL-22T	**III Year / Semester VI: Paper–7 - DSE** A. 8051 Microcontroller (Theory) B. Digital Communication (Theory)	4hrs/ Week	4	60 Hrs
MC-6-EL-22P DC-6-EL-22P	**III Year / Semester VI: Paper–7 - DSE** A. 8051 Microcontroller (Practical) B. Digital Communication (Practical)	3 hrs/ Week	1	45 Hrs
AP-6-EL-22T FOR-6-EL-22T	**III Year / Semester VI: Paper–SEC-4** A. Arduino Programming B. Fundamentals of Robotics	2hrs/ Week	2	30 Hrs
EPR-6- EL-22	**III Year / Semester VI: Project**	2hrs/ Week	4	30 Hrs
	Total		42	

PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)

PEO 1	Graduates will develop the skill to pursue PG and Integrated Ph.D.
PEO 2	Graduates are provided with domain knowledge to get employed in IT industries, Scientific & Research organizations and relevant fields.
PEO 3	Graduates are trained to demonstrate creativity, develop innovative ideas equipped with Collaborative working Skills
PEO 4	Graduates will develop positive attitude, skills which will enable them to become a multi facet personality, shining in any chosen field with sense of Social Responsibility and environmental consciousness.

PROGRAMME OUT COMES (POs)

PO 1	Acquire basic **knowledge** in Science subjects such as Mathematics, Electronics and Computer Science with a thrust on fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
PO 2	Graduates are provided with **practical training, hands-on and project** experience to meet the industrial needs.
PO 3	To boost **critical thinking skills** to identify, analyze and solve problems of their core areas.
PO 4	Ability to **think creatively** to design, develop algorithms and provide solutions using Modern tools.
PO 5	To enhance **arithmetic skills and Logical reasoning** for better **employability.**
PO 6	To train the students as **lifelong learners with interdisciplinary approach** towards **sustainable development.**
PO 7	To impart **life skills** to express ideas and views clearly and effectively.
PO 8	To imbibe **ethical, moral and social values** in personal and social life leading to **highly cultured and civilized personality**.

Knowledge (Factual & Conceptual Knowledge)	Disciplinary Knowledge
Skills (Procedural Knowledge)	- Communication Skills - Critical Skills - Problem Solving - Analytical Reasoning - Research – related skills - Reflective thinking - Information / Digital Literacy - Self-directed Learning
Attitude (Meta cognitive Knowledge)	- Cooperation - Scientific Reasoning - Multicultural Competence - Moral and Ethical Awareness / Reasoning - Leadership Readiness / Qualities - Lifelong Learning

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1	Students develop problem solving skills and learn various concepts which help in developing logical tools and models used to solve various real life problems.
PSO 2	Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines.
PSO 3	Students attain comprehensive knowledge in electronics that will help to construct, analyze, verify, program and troubleshoot digital and discrete component circuits using appropriate techniques.
PSO 4	Ability to design and develop software applications to address real world problems using Programming languages , Databases, Operating Systems , and Computer Network Concepts
PSO 5	To develop knowledge citizens with transferable skills and multi disciplinary global competencies.
PSO 6	To build life skills and through value-based education and service-oriented programs.

B. Sc (MECs) I Year / Semester - I
Electronics – 1 Circuit Analysis (Theory)

Course Objectives:	
● To Learn Circuit analysis techniques for analyzing the operation and behavior of various electronic circuits. ● Students able to demonstrate the skills to design and construct electronics circuits with passive and active circuit elements.	
Course Outcomes:	
CO1. Analyze AC circuits and apply various current & voltage laws to solve problems of simple AC & DC circuits.	**BL4**
CO2. Apply various network theorems to solve problems of simple AC & DC circuits & networks.	**BL4**
CO3. Analyze the transient response of RC & RL circuits as filters, integrator & differentiators.	**BL3**
CO4. Analyze the resonant circuits and apply CRO for measurement of electrical quantities.	**BL4**

B. Sc (MECs) I Year / Semester - II
Electronics – 2 Electronic Devices & Circuits (Theory)

Course Objectives:	
• To Learn construction, working, configurations and applications of semiconductor electronic devices and their circuits and apply the knowledge in understanding rectifiers, amplifiers, oscillators and other analog circuits.	
Course Outcomes: Students can	
CO1. Apply the construction, working & characteristics of various diodes for understanding applications of diodes.	**BL4**
CO2. Apply the construction, working, characteristics & biasing of BJT for understanding applications such as amplifiers, oscillators etc,	**BL4**
CO3. Apply the construction, working, characteristics of UJT, FET & MOSFET in application circuits.	**BL4**
CO4. Apply the construction, working, characteristics of SCR, and photo electric devices in power electronics circuits.	**BL4**

B.Sc(MECs) II Year / Semester - III
Electronics – 3 Analog Circuits (Theory)

Course Objectives:	
To impart knowledge and skills to design, construct, operate, test and analyze analog circuits like power supplies, amplifiers, oscillators and multivibrators to use in application circuits.	
Course Outcomes: Students can	
CO1. Apply the knowledge of rectifiers and filters in understanding voltage regulators & regulated power supplies	**BL4**
CO2. Apply the knowledge of voltage regulators and regulated power supplies in the construction of real time application circuits.	**BL4**
CO3. Analyze the working of amplifiers and the concept of feed back to understand the application circuits.	**BL3**
CO4. Apply the skills of construction & working of oscillators and multivibrators in the construction of application circuits.	**BL4**

B. Sc (MECs) II Year / Semester - IV
Electronics – 4 Linear Integrated Circuits & Basic Communication Electronics (Theory)

Course Objectives:	
• To teach and provide skills to design, construct, demonstrate and analyze applications using Operational amplifiers &Timer Linear ICs • To teach basic communication methods and circuits of AM, FM and analog pulse modulations.	
Course Outcomes: Students can	
CO1. Analyze the working, characteristics, limitations and basic operational amplifier circuits to apply for understanding the applications.	**BL3**
CO2. Solve problems and design real time application circuits using Op-Amp & 555 timer ICs.	**BL5**
CO3. Understand the basics of analog communications with need for communications and analyze AM modulation & demodulation.	**BL3**
CO4. Analyze the basics of analog FM modulation & demodulation and basic pulse modulation.	**BL3**

B. Sc (MECs) III Year / Semester - V
Electronics – 5A Digital Electronics & Basics of VHDL (Theory)

Course Objectives:	
• To provide knowledge and skills to design and analyze combinational & sequential logic circuits using Boolean algebra & K-maps and construct & demonstrate logic circuits using digital ICs and hardware description language (HDL).	
Course Outcomes:	
CO1. Understand & analyze the skills of number systems & codes, Boolean algebra & logic gates to solve the problems in designing logic circuits.ols.	**BL3**
CO2. Apply the skills of combinational logic circuits to solve the problems and design the application circuits.	**BL4**
CO3. Apply the skills of sequential logic circuits to solve the problems and design the application circuits.	**BL4**
CO4. Understand & analyze the skills of VHDL language to simulate digital circuits using electronic design tools.	**BL3**

B. Sc (MECs) III Year / Semester - V
Electronics – 5B Electronic Instrumentation (Theory)

Course Objectives:	
• To provide knowledge and skills to the students to use of various electronic instruments with understanding their construction, principles of operation, standards and measurements and application of electronics and technology of instruments for industrial automation and process control systems.	
Course Outcomes:	
CO1. Understand the characteristics and standards of instruments.	**BL2**
CO2. Understand and analyze the types & functions of transducers & sensors with their characteristics & specifications.	**BL3**
CO3. Apply the skills of bridges to use in instrumentation.	**BL4**
CO4. Analyze and apply the skills of testing & measuring instruments.	**BL4**

B. Sc (MECs) III Year / Semester - V
Skill Enhancement Course (SEC)
Electronics – SEC 3A Internet of Things (Theory)

Course Objectives:	
• To study fundamental concepts, roles of sensors, protocols used for IoT design, appreciate the role of big data, cloud computing and data analytics in a typical IoT system.	
Course Outcomes:	
CO1. Understand and analyze the fundamentals of IoT with reference architecture, software design and communication modules.	**BL3**
CO2. Analyze sensors & actuators in designing IoT and understand technologies behind IoT.	**BL3**

B. Sc (MECs) III Year / Semester - V
Skill Enhancement Course (SEC)
Electronics – SEC 3B Basic VLSI Design (Theory)

Course Objectives:	
• Elucidate the CMOS process flow, Analyze various critical processing steps in micro fabrication. Appreciate the advanced methods involved in IC fabrication. Analyze the advancements in CMOS process fabrication with scaling in technology.	
Course Outcomes:	
CO1. Understand and analyze VLSI and MOS transistor theory.	**BL3**
CO2. Apply CMOS processing technology and layouts to design logic gate & circuits.	**BL4**

B. Sc (MECs) III Year / Semester - V
Generic Elective (GE)
Electronics – GE Paper 1 – Electronics in Daily Life (Theory)

Course Objectives:	
• To provide knowledge and skills to the students to know about the power supply's to home appliances, consumer electronics audio systems and communication devices with understanding their construction, principles of operation, standards specifications and measurements.	
Course Outcomes:	
CO1. Remember and understand the electronics and its importance in daily life.	**BL2**
CO2. Remember and understand the consumer electronics and its importance in daily life.	**BL2**
CO3. Remember and understand the audio & video systems and its importance in daily life.	**BL2**
CO4.Remember and understand the mobile gadgets & office equipments and its importance in daily life.	**BL2**

B. Sc (MECs) III Year / Semester - V
Generic Elective (GE)
Electronics – GE Paper 2 – Computer Hardware Electronics & Networks (Theory)

Course Objectives:	
• To equip the students with a general overview of the concepts and fundamentals of computer hardware devices and networks, Familiarize the students with the standard models of computer networks	
Course Outcomes:	
CO1. Understand & analyze the concept of number systems, basic computers and computer interface.	**BL3**
CO2. Understand and analyze the computer architecture and organization.	**BL3**
CO3. Understand the working of computer memory devices and peripherals.	**BL2**
CO4. Understand and analyze the functioning and working of computer networks and networking devices.	**BL3**

B. Sc (MECs) III Year / Semester - VI
Electronics – 6A 8051 Microcontroller (Theory)

Course Objectives:	
• To teach students Architecture, instructions, assembly & embedded C programs and interfacing using 8051 microcontroller to acquire the knowledge and skills for construction & designing microcontroller based applications.	
Course Outcomes:	
CO1. Analyze the architecture of 8051 Microcontroller with various pins, registers, ports & interrupts.	**BL3**
CO2. Analyze the instructions with addressing modes to learn programming using 8051 microcontroller.	**BL3**
CO3. Apply the skills to write and execute the assembly & embedded C programs using 8051 microcontroller.	**BL4**
CO4. Apply the skill of timers, serial communication and interfacing data converters to design applications using 8051 microcontroller.	**BL4**

B. Sc (MECs) III Year / Semester - VI
Electronics – 6B Digital Communication (Theory)

Course Objectives:	
• To teach digital communication principles with modulation methods & techniques, error detection and coding.	
Course Outcomes:	
CO1. Understand types of signals & sampling methods and analyze various pulse analog modulation methods.	**BL3**
CO2. Analyze and apply various pulse code modulation methods to understand carrier modulation techniques.	**BL4**
CO3. Analyze carrier modulation techniques to arrive the need for digital wireless communication.	**BL3**
CO4. Analyze the various mobile access techniques to understand modern communication systems.	**BL3**

B. Sc (MECs) III Year / Semester - VI
Skill Enhancement Course (SEC)
Electronics – SEC 4A Arduino Programming (Theory)

Course Objectives:	
• To impart knowledge and skills on Arduino programming, working with Arduino IDE, reading and writing digital and analog data, serial communication and interfacing.	
Course Outcomes:	
CO1. Understand and analyze the basics of Arduino with programming structure to write application programs.	**BL3**
CO2. Write & apply programs to design applications using Arduino programming with various input, output devices and sensors.	**BL4**

B. Sc (MECs) III Year / Semester - VI
Skill Enhancement Course (SEC)
Electronics – SEC 4B Fundamentals of Robotics (Theory)

Course Objectives:	
• Aim to teach the concepts and techniques in robotics, manipulator kinematics, dynamics, sensors and actuators.	
Course Outcomes:	
CO1. Able to analyze designing and controlling various outputs with actuators & sensors.	**BL3**
CO2. Able to apply the skills for interfacing the indicators, displays and timer and counter operations.	**BL4**

Non-CGPA Value Added Course – 1

(Certificate Course)

CRASH COURSE ON PCB DESIGN

Course Objectives: This Certificate course will enable the students to understand the fundamentals of PCB design and its tools. This course would lay more emphasis on developing the practical skills of the student.
Course Outcomes: After the completion of the course, the students will be able to identify different designing methods and tools to design PCB to produce PCB boards.

Non-CGPA Value Added Course – 2

(Certificate Course)

Certificate Course in PC Hardware & Networking

Course Objectives: To train the students to acquire basic knowledge in computer hardware and peripherals for installation, PC assembly, trouble shooting and maintenance including system management and its backup and to undertake disaster prevention, a basic knowledge of TCP/IP networks work group, internet and intranet.
Course Outcomes: The student will able to know the Basic of Computer assembling and trouble shooting. This course will provide the brief knowledge of Computer networking and trouble shooting.