

SRI VENKATESWARA UNIVERSITY :: TIRUPATI



ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Programme: B.Sc. Honours in Electronics (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	3+2	4
	I	2	Advances in Mathematical, Physical and Chemical Sciences	3+2	4
	II	3	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
	II	4	Circuit theory and electronic devices	3	3
			Circuit theory and electronic devices Practical Course	2	1
II	III	5	Semiconductor devices and Materials	3	3
			Semiconductor devices and Materials Practical Course	2	1
		6	Digital Electronics	3	3
			Digital Electronics Practical Course	2	1
		7	Analog Electronics	3	3
			Analog Electronics Practical Course	2	1
		8	Electronic communication system	3	3
			Electronic communication system Practical Course	2	1
	IV	9	Electrical and electronics instrumentation	3	3
			Electrical and electronics instrumentation Practical Course	2	1
		10	Microcontrol system	3	3
			Microcontrol system Practical Course	2	1
		11	Microprocessor system	3	3
			Microprocessor system Practical Course	2	1



Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
III	V	12	Cellular Mobile Communication	3	3
			Cellular Mobile Communication Practical Course	2	1
		13	Computer Network	3	3
			Computer Network Practical Course	2	1
		14 A	Industrial Electronics	3	3
			Industrial Electronics Practical Course	2	1
		OR			
		14 B	Embedded system Design	3	3
			Embedded system Design Practical Course	2	1
		15 A	Digital system Design	3	3
			Digital system Design Practical Course	2	1
		OR			
		15 B	Consumer Electronics	3	3
			Consumer Electronics Practical Course	2	1
	VI	Internship			
IV	VII	16 A	Medical Electronics	3	3
			Medical Electronics Practical Course	2	1
		OR			
		16 B	Advanced Communication Systems	3	3
			Advanced Communication Systems Practical Course	2	1
		17 A	Principles and utility of electronic domestic applications	3	3
			Principles and utility of electronic domestic applications Practical Course	2	1
		OR			
		17 B	Digital and Data Communication Systems	3	3
			Digital and Data Communication Systems Practical Course	2	1
		18 A	RF Networks	3	3
			RF Networks Practical Course	2	1
		OR			
		18 B	Wireless Sensor Network Design	3	3
			Wireless Sensor Network Design Practical Course	2	1
		SEC			
		19 A	Sensors	3	3
			Sensors Practical Course	2	1
		OR			
		19 B	Bio-medical Instrumentation	3	3
			Bio-medical Instrumentation Practical Course	2	1
		20 A	Digital Signal Processing	3	3

SEMESTER-V
COURSE 12: CELLULAR MOBILE COMMUNICATION

Theory

Credits: 4

5 hrs/week

The students will learn:

- a. basics of digital cellular system, cordless telephony and cell structure
- b. GSM wireless protocol and markup language fundamentals
- c. basics of WLL and Bluetooth technology

UNIT-I

Advanced mobile phone service - Global system for mobile communication - Digital cellular system

Cordless telephony - Third generation wireless systems.

UNIT-II

7 Cell structure - Hand off - roaming management - Hand off detection - Channel assignment techniques - Interference - ACI, CCI - Intersystem hand off and authentication - Network signaling - Cellular digital packet data

UNIT-III

GSM - Network signaling, mobility management, short message service - International roaming, administration and operation.

UNIT-IV

Wireless application protocol - Architecture - Datagram - Transport layer securities - Transaction protocol - Session protocol application environment, wireless markup language, WML - Script wireless telephony applications.

UNIT-V

Third generation mobile services - Wireless local loop - Bluetooth technology.

Text Books

1. Mobile Communications - Jochen Schiller, 7/e, Pearson Education, 2003.
2. Principles of Wireless Networks - Kauch Pahalavan & Prahanet Krishnamoorthy, 2/e, Pearson Education, 2004.

Reference Books

1. Wireless and Mobile Networks Architecture - Yi-Bing Lin & Imnch Chlantee, John Wiley, 2001.
2. Wireless and Mobile Communication - Rappaport, Pearson Education, 2001.

V. Balanubabu
(BOS chairman)

SEMESTER-V
COURSE 13: COMPUTER NETWORK

Theory

Credits: 4

5 hrs/week

Objective

The students will learn :

- a. provides a general introduction to computer networking that would be useful to all personnel who deal with distributed systems,
- b. encompassing both technical and managerial aspects.
- c. to help students better understand the challenges and opportunities faced by modern business,
- d. topics include LAN and WAN implementations, the Internet and internet applications.

UNIT-I

Network structure Point to Point, Broadcast, Multicast - Horizontal and vertical distribution - Star, Mesh, tree, bus structures - OSI 7 layer model - Architecture - Functions of layers - Packet switches, circuit switching and message switching.

UNIT-II

Physical layer - Transmission media - Channel allocation methods - ALOHA, S-ALOHA, FINITE ALOHA - LAN Protocols IEEE802.3, 802.4, 802.5, 802.6 and 802.11.

UNIT-III

Data link layer - Framing - Error detection - Error correction - CRC - Stop and wait - Go back N - Sliding window Protocol - Selective repeat.

UNIT-IV

Network layer - Routing algorithms and congestion control algorithms - Repeaters, Bridges, Routers and Gateways, Inter networking - Introduction to transport layer and session layer.

UNIT-V

Presentation layer - coding, compression and cryptography - Introduction to
Application layer - High performance networks - ATM, Fast Ethernet, FDDI,
DQDB, SONET and SDH.

Text Books

1. Computer Networks - *Andrew S. Tanenbaum*, 4/e, Pearson Education, 2005.
2. Data and Computer Communication - *W. Stallings*, 7/e, Pearson Education, 2006.

Reference Books

1. Introduction to Data Communications and Networking -
Behrouz & Forouzan, 4/e, McGraw Hill Book Company, 2004.
2. Telecommunication Networks - Protocols Modeling and Analysis -
Misha Stewart, 2/e, Pearson Education, 2002.

V. Balanubabu
(BOS chairman)

SEMESTER-V
COURSE 14 A: INDUSTRIAL ELECTRONICS

Theory

Credits: 3

3 hrs/week

Note-1: For Semester-V, for the domain subject Electronics, any one of the above three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (A, B, C allotment is random, not on any priority basis).

Note-2: One of the main objectives of Skill Enhancement Courses(SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

- I. Learning Outcomes: Students after successful completion of the course will be able to:
1. Identify various facilities required to set up a basic Instrumentation Laboratory.
 2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
 3. Demonstrate skills of using instruments like Rectifiers, Multimeters, Power supplies, Voltage Regulators etc. through hands on experience.
 4. Understand the Principle and operation of different Electronic Heating devices.

Syllabus:

UNIT-I (20 hours)

Rectifiers and filters: Rectifiers– Half wave, full wave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter- L section and section filters.

Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three terminal regulators (78XX and 79XX).

UNIT-II (10 hours)

Power Supplies: Block diagram of regulated power supply – A simple regulated transistorized power supply (circuit and working) – Principle and working of switch mode power supply (SMPS).

UNIT-III (10 hours)

Voltage Multipliers: Half wave voltage doubler, Full wave voltage doubler, Voltage Tripler circuit diagram and working mentioning of applications of voltage multipliers.

UNIT-IV (10 hours)

Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms, mathematical analysis for resistive load - SCR Full wave rectifier circuit, working with wave forms, mathematical analysis for resistive load – SCR as inverter parallel and series circuits.

UNIT-V (10 hours)

Heat effects: Resistance, inductance and dielectric heating. Principle of operations and its applications.

Reference Books:

5. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal.
6. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
7. Industrial Electronics, G.K. Mithal, Khanna Publishers.
8. Electronic Devices and Circuits – G.K. Mithal.
9. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
10. Microelectronics- J. Millman and A. Grabel – TMH

V. Balakrishna
(Bos chairman)

SEMESTER-V
COURSE 14 A: INDUSTRIAL ELECTRONICS
Credits: 1

Practical

2 hrs/week

(ANY SIX EXPERIMENTES SHOULD BE DONE)

1. D.C Power supply and filters.
2. Transistor series regulator
3. Transistor as a shunt regulator
4. Voltage regulator using IC-7805 and IC-7905.
5. Voltage doubler using diodes
6. Voltage Tripler using diodes
7. SCR VI characteristics.
8. SCR Series inverter
9. SCR parallel inverter.

V. Balanubabu
(BOS chairman)

SEMESTER-V
COURSE 15 A: DIGITAL SYSTEM DESIGN

Theory

Credits: 3

3 hrs/week

- a. the fundamentals of Boolean algebra and simplification of Boolean functions
- b. the combinational logic circuits and their design using HDL
- c. the sequential logic circuits and their design using HDL

UNIT-I

Boolean Algebra and Logic Gates: Review of binary number systems - Binary arithmetic - Binary codes - Boolean Algebra and theorems - Boolean functions - Simplifications of Boolean functions using Karnaugh map and tabulation methods - Logic gates.

UNIT-II

Combinational Logic: Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations - Code conversions - Introduction to Hardware Description Language (HDL).

UNIT-III

Design with MSI Devices: Decoders and Encoders - Multiplexers and Demultiplexers - Memory and programming logic - HDL for combinational circuits.

UNIT-IV

Synchronous Sequential Logic: Sequential circuits - Flip-flops - Analysis and design procedures - State reduction and state assignments - Shift registers - Counters - HDL for sequential logic circuits, shift registers and counters.

UNIT-V

Asynchronous Sequential Logic: Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race free state assignment - Hazards.

Text Books

1. Digital Logic and Computer Design - *M. Morris Mano*, Prentice Hall of India Private Limited.

2. A Verilog HDL Premier - J. Baskar, Pearson Education.

Reference Books

1. Analysis and Modeling of Digital Systems - Zain Allabedin Navabee, 2/e, McGrawHill Publishing Co. Ltd., New Delhi.
2. An Engineering Approach to Digital Design - Fletcher, Prentice Hall of India Private Limited.
3. Modern Digital Electronics - R.P. Jain, 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. Digital Fundamentals - T.L. Floyd, 8/e, Pearson Education.

Co-Curricular Activities

(a) Mandatory: (*Training of students by teacher in field related skills: (lab: 10 + field: 05)*)

1. For Teacher: Training of students by the teacher in the laboratory/field for not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.
For Student: Students shall (individually) visit a local electrical and electronics shop or small firm to familiarize with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments. (Or) Student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern (Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan. (Or) Student shall visit a mobile smart phone repair shop and observe the different components on the PCB (Motherboard), different ICs (chips) used in the motherboard and trouble shooting of touch screen in smart phones.

Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10 pages in the given format to be submitted to the teacher.

2. Max marks for Fieldwork/Project work: 05.
3. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*
4. Unit tests (IE)

Suggested Co-Curricular Activities

1. Training of students by related industrial / technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniques with safety and security).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Making your own stethoscope at home.
5. Making seven segment display at home.

6. Preparation of videos on tools and techniques in various branches of instrumentation.
7. Collection of material/figures/photos related to products of Measuring Instruments, Display Modules and Biomedical Instruments and arrange them in a systematic way in a file.
8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.
9. Invited lectures and presentations on related topics by Technical /industrial experts

V. Balaraman
(Bos chairman)

SEMESTER-V
COURSE 14 B: EMBEDDED SYSTEMS DESIGN

Theory

Credits: 4

5 hrs/week

UNIT 1: (15Hrs)

Introduction to Embedded Systems:

Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

UNIT 2: (15Hrs)

Custom Single Purpose Processor – Hardware Development: Introduction, Combinational logic, Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

UNIT 3: (15Hrs)General Purpose Processor – Software Development: Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system. Debugging Techniques: Testing on your Host Machine, and Instruction Set Simulators. **UNIT 4: (10Hrs)**

RTWA for Embedded Systems: Introduction, Timers, Counters and Watchdog Timers, UART, Pulse Width Modulators, LCD Controllers, Keypad Controllers, Stepper Motor Controllers, Analog-to-Digital Converters, and Real Time Clocks.

UNIT 5: (10Hrs)Advanced Communication Principles: Parallel Communication, Serial Communication, Wireless Communication, Serial Protocols: I²C, CAN, FireWire, and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: IrDA, Bluetooth, and IEEE 802.11.**TEXTBOOKS:**

1. Embedded System Design – A Unified Hardware/ Software Introduction By Frank Vahid / Tony Givargis – WILEY EDITION.
2. Embedded Systems Architecture, Programming and Design – 2nd Edition By Raj Kamal – Tata McGraw-Hill Education.

REFERENCES:

1. An Embedded Software Premier - David E- Siman, PEARSON
2. Education Embedded / real - time systems - DR. K.V.K.K. Prasad, dreamtech
3. The art of programming Embedded systems, Jack G. Ganssle, academicpress
4. Intelligent Embedded systems, Louis L. Odette, Addison Wesley, 1991

V. Balakrishna
 (BOS chairman)

SEMESTER-V
COURSE 15 B: CONSUMER ELECTRONICS

Theory

Credits: 3

3 hrs/week

Learning Outcomes:

- To study Microwave ovens – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study washing machines – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Air conditioners and refrigerators – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Home/Office digital devices – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Digital access devices like – block diagram - working - types – wiring and safety instructions. – care and cleaning

Unit– I

Microwave Ovens – Microwaves (Range used in Microwave ovens)– Microwave oven block diagram – LCD timer with alarm – Single-Chip Controllers – types of Microwave oven – Wiring and Safety instructions – care and Cleaning.

Unit– II

Washing Machines – Electronic controller for washing machines – Washing machine hardware and software – Types of washing machines – Fuzzy logic washing machines Features of washing machines.

Unit–III

Air Conditioners And Refrigerators - Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air conditioning systems – Unitary and central air conditioning systems – Split air conditioners.

Unit– IV

Home/Office Digital Devices – Facsimile machine – Xerographic copier – calculators – Structure of a calculator – Internal organization of a calculator – Servicing electronic calculators – Digital clocks – Block diagram of a digital clock.

Unit– V

Digital Access Devices – Digital computer – Internet access – online ticket reservation – functions and networks – barcode scanner and decoder – Electronic Fund Transfer
 – Automated Teller Machines(ATMs)–Set-Top boxes–Digital cable TV – Video on demand.

TEXTBOOKS:

1. S.P. Bali, Consumer Electronics – Pearson Education, New Delhi, 2005.
2. R.G. Gupta Audio and Video systems Tata McGraw Hill (2004)

Learning outcomes:

- The Student can gain good knowledge on microwave ovens and implement in practical applications.
- The Student can gain good knowledge on Washing Machines and implement in practical applications.
- The Student can gain good knowledge on Air conditioners and Refrigerators and implement in practical applications.
- The Student can gain good knowledge on Digital access devices and implement in practical applications.
- Ability to measure strain, displacement, velocity, angular velocity, temperature, pressure Vacuum, and Flow.

V. Balaraman
(BOS chairman)

SEMESTER-V
COURSE 15 B: CONSUMER ELECTRONICS

Practical

Credits: 1

2 hrs/week

(At least two Activities should be done)

1. Study of PA systems for various situations –Public gathering , closed theatre/ Auditorium, Conference room, Prepare Bill of Material(Costing)
2. Installation of Audio/Video systems –site preparation , electrical requirements,cables and connectors
3. Market Survey of products (at least one from each module)
4. Identification of block and tracing the system.
Assembly and Disassembly of system using Toolkit
5. Assembly and Disassembly of system and printer.

NOTE: one activity as directed in practical course is equivalent to 4 experiments

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(Bos chairman)