

SRI VENKATESWARA UNIVERSITY:TIRUPATI
REVISED UG SYLLABUS UNDER CBCS

(From Academic Year 2020-21)

PROGRAMME: FOUR YEAR B.Sc.

Domain Subject: Electronics

Skill Enhancement Courses (SECs) for Semester V,

From 2022-23 (Syllabus-Curriculum)

Structure of SECs for Semester – V

(To Choose One pair from the TWO alternate pairs of SECs)

Courses 6&7	Name of the Course	Theory+ Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6A	Industrial Electronics	3+3	25	75	3+2	100+50
7A	Electronic Instrumentation	3+3	25	75	3+2	100+50

OR

Courses 6&7	Name of the Course	Theory+ Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6B	Embedded systems Design	3+3	25	75	3+2	100+50
7B	Consumer Electronics	3+3	25	75	3+2	100+50

Note-1: For Semester–V, for the domain subject Electronics, any one of the above two pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B. The pair shall not be broken (A,B 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.

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SRI VENKATESWARA UNIVERSITY:TIRUPATI
Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: ELECTRONICS
4 Year B.Sc.,-Semester-V
Course: 6A Industrial Electronics
(Skill Enhancement Course (Elective), 3+2Credits)
Max. Marks: Theory: 100+Practical: 50

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

II Syllabus : (Total Hours: 90 including Teaching, Lab, Field Training, Unit Tests etc.)

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 π -Section filters.

Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three Terminal I.C 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 Supplies(SMPS), UPS – Block diagram and working, Types of UPS- Offline, Online, Line Interactive , Differences & Applications of offline and online UPS.

UNIT-III (10 hours)

Voltage Multipliers: Half wave voltage Doublers(series¶llel), Full wave voltage Doubler, Voltage Tripler, Voltage Quadrupler, circuit diagrams and working, applications of voltage multipliers and their limitations .

UNIT-IV (10hours)

Single Phase Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms and mathematical analysis for R and R-L loads - SCR Full wave rectifier circuit, working with wave forms and mathematical analysis for R and R-L loads–SCR as inverter- parallel and series circuits.

UNIT-V(10 hours)

Heat effects: Resistance, inductance and dielectric heating methods, Principles of operation, types in each method, advantages & disadvantages , differences and applications.

Reference Books:

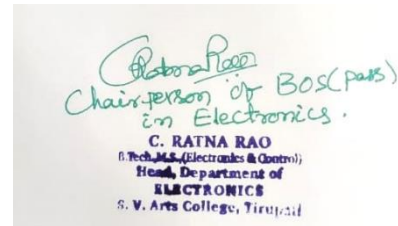
1. Unified Electronics Volume II by J.P.Agarwal and Amit Agarwal.
2. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
3. Industrial Electronics, G. K. Mithal, Khanna Publishers.
4. Electronic Devices and Circuits – G.K.Mithal.
5. Electronic Devices and Circuits – Millman and Halkias- Tata Mc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

ELECTRONICS: LAB – 6A
Industrial Electronics
(ANY SIX EXPERIMENTES SHOULD BE DONE)

1. D.C Power supplies and filters.
2. Transistor series regulator
3. Transistor shunt regulator
4. Voltage regulator using IC-7805 and IC-7905.
5. Voltage doublers using diodes
6. Voltage Tripler using diodes
7. SCR V-I Characteristics.
8. SCR Series inverter
9. SCR Parallel inverter.

NOTE:

At least 25% of experiments are to be carried out using SPICE simulations(e.g MULTISIM or MICROSIM)



SRI VENKATESWARA UNIVERSITY:TIRUPATI

Domain Subject: ELECTRONICS

4 Year B.Sc.,-Semester-V

Course 6A: Industrial Electronics

Model Question paper

(w.e.f. 2022-23)

Time: 3hours

Max. Marks: 75

Part A (5 X5 =25Marks)

Answer any FIVE of the following

1. Draw and explain about choke input (inductor) filter.
2. Explain about three terminal Regulators (78XX and 79XX).
3. Mention the differences between offline and online UPS systems.
4. Draw the block diagram of regulated power supplies.
5. With a neat circuit describe the action of series type Half- wave voltage doubler.
6. Explain the applications of voltage multipliers.
7. Explain how SCR is used as series inverter with circuit diagram.
8. Draw and explain about SCR full wave rectifier for Resistive load.
9. Explain the differences between dielectric heating and induction heating.
10. What are the applications of induction heating?

Part- B(5x10=50 Marks)

Answer the following

11. What is Rectifier? Draw the circuit diagram of a Full wave rectifier and explain its mathematical analysis.

OR

12. Draw the Circuit of Transistor series and Shunt voltage regulator and explain their working.
13. Draw the block diagram and working of switch mode power supply and explain its working.

OR

14. Describe the working of Transistorized power supply with a neat diagram.
15. Explain in detail about the voltage Tripler circuit with a neat diagram.

OR

16. Explain the principle and working or voltage quadrupler.
17. Draw the circuit diagram of Diode half wave rectifier and explain its operation, give mathematical analysis.

OR

18. Draw and explain how SCR is used as parallel inverter with a neat diagram.
19. Explain the working principle of induction heating and mention it's advantages.

OR

20. Explain the working principle of resistance heating and mention its applications.

SRI VENKATESWARA UNIVERSITY:TIRUPATI
Semester-wise Revised Syllabus Under CBCS, 2020-21

Domain Subject: ELECTRONICS
4 Year B.Sc.-Semester-V
Course 7A: Electronic Instrumentation
(Skill Enhancement Course (Elective),3+2Credits)
Max. Marks: Theory: 100+Practical: 50

- 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 CRO, Function Generator, and Multimeter etc. through hands on experience.
 4. Understand the Principle and operation of different display devices used in the display systems and different transducers
 5. Comprehend the applications of various biomedical instruments in daily life like B.P.Meter, ECG, Pulse Oxymeter etc. and know the handling procedures with safety and security.

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)

UNIT-I Introduction To Instruments (10hrs.)

Types of electronic Instruments - Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach), Sensitivity, $3\frac{1}{2}$ display and $4\frac{1}{2}$ display Digital Multimeters, Basic ideas on Function generator.

UNIT- II Transducers (10hrs.)

Classification of transducers, Selection of Transducers, Resistive, Capacitive & Inductive transducers, Resistive and capacitive touch screen transducer used in mobiles, Displacement transducer-LVDT, Piezo electric transducer, Photo transducer, Digital transducer, Fiber optic sensors.

UNIT-III Display Instruments (10hrs.)

Introduction to Display devices, Seven Segment Displays, LED Displays, Construction and operation (Display of numbers),Types of SSDs (Common Anode & Common Cathode type),Limitations of SSDs, Liquid Crystal Displays, Applications of LCD modules.

UNIT-IV Biomedical Instruments (15hrs.)

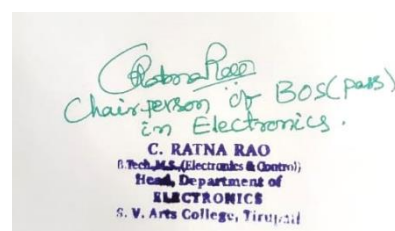
Basic operating principles and uses of (i) Clinical thermometer (ii) Stethoscope (iii) Sphygmomanometer (iv) ECG machine (v) Radiography (vi) Ophthalmoscope (vii) Ultrasound scanning (viii) Pulse oxymeter (ix) Glucometer, Basic ideas of CT scan and MRI scan.

UNIT-V Logic and Distributed control Systems (PLCs & DCS) (15 hrs)

Over view of PLC systems –I/O Modules –Power Supplies- I/O Slots, General PLC Programming Procedure –Programming ON-OFF Outputs, Auxiliary Commands and Functions –Creating Ladder Diagrams from process control descriptions –Ladder Logic for Traffic Light Control System.
Distributed Control Systems (DCS) : Evolution of DCS- Building blocks- different architectures and their comparison- descriptions and functions of local control units-basic elements & functions- operator stations-data highways- Redundancy.

Reference Books:

1. Electronic Instrumentation by H. S. Kalsi, TMH Publishers
2. Electronic Instrument Hand Book by Clyde F. Coombs, Mc Graw Hill
3. Introduction to Biomedical Instrumentation by Mandeep Singh, PHI Learning.
4. Biomedical Instrumentation and Measurements by Leslie Cromwell, Prentice Hall India.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Alfrick,
8. John Webb, Ronald Reis. A ; Programmable Logic Controllers Principles and Applications: 3rd edition, Prentice Hall Inc, New Jersey, 1995.
9. Lucas M.P “ Distributed Control System” Van Nostrand Reinhold Co, New York 2nd edition 1986.
10. Petruzella, “ Programmable Logic Controllers ” 3rd edition , TMH, New York.
11. Web sources suggested by the teacher concerned and the college librarian including reading material.



ELECTRONICS LAB-7A
Electronic Instrumentation-PRACTICAL SYLLABUS
(30Hrs.MaxMarks: 50)

III. Learning Outcomes: On successful completion of this practical course , student shall be able to:

1. List out, identify and handle various equipment in Instrumentation Laboratory or Electronic Laboratory.
2. Learn the construction, operational principles of various instruments.
3. Demonstrate skills in handling, Maintenance & troubleshooting of different instruments used in the Labs.
4. Acquire skills in observing and measuring various electrical and electronic quantities.
5. Perform some techniques related to Biomedical Instrumentation and measurement of certain physiological parameters like body temperature, B.P. and sugar levels etc.

IV. Practical (Laboratory) Syllabus: All the experiments are compulsory(30hrs. Maxmarks:50)

1. Familiarization of digital multimeter and its usage in the measurements of
(i) Resistance, (ii) current, (iii) AC & DC voltages and for (i) continuity test (ii) diode test and (iii) transistor test.
2. Measure the AC and DC voltages, frequency using a CRO and compare the values Measured with other instruments like Digital Multimeter.
3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure their frequencies. Compare the measured values with actual values.
4. Display the numbers from 0 to 9 on a single Seven Segment Display module by Applying voltages.
5. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.
7. Measurement of Blood Pressure of a person using a B.P meter and record the values and analyze them.
8. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks.
9. Observe and understand the operation of a Digital Pulse oxymeter and measure the pulse rate of different people and understand the working of the meter

Lab References:

1. Electronic Measurement and Instrumentation by J.P. Navani , S .Chand & Co Ltd
2. Principles of Electronic Instrumentation by A DeSa, El sevier Science Publ.
3. Electronic Measurements and Instrumentation by S.P.Bihari, YogitaKumari, Dr.Vinay Kakka, Vayu Education of India.
4. Laboratory Manual For Introductory Electronics Experiments by Maheshwari, New Age
5. International (P) Ltd., Publishers.
6. Electricity-Electronics Fundamentals: A Text-lab Manual by Paul B.Zbar
7. Joseph Sloop, & Joseph G. Sloop, McGraw- Hill Education.
8. Web sources suggested by the teacher concerned.

Co-Curricular Activities:

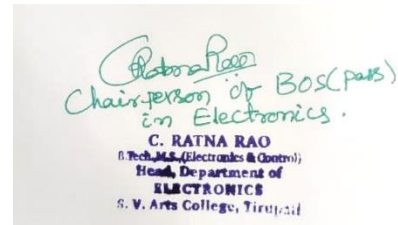
(a) Mandatory: (*Training of students by the teacher in field related skills:(lab:10+field:05)*)

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 themselves 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) The student shall visit a diagnostic center and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic center and observe the CT scan and MRI scan.(Or) Students 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 troubleshooting of touch screens in smart phones. Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10pages 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 a place visited, observations, findings and acknowledgments.*
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. Make your own stethoscope at home.
5. Making a 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



SRI VENKATESWARA UNIVERSITY:TIRUPATI
Domain Subject: ELECTRONICS
4 Year B.Sc.,-Semester-V
Course 7A: Electronic Instrumentation
Model Question paper
(w.e.f. 2022-23)

Time: 3 hours

Max. Marks: 75

PartA (5 X5 =25Marks)
Answer any FIVE of the following

1. What is the operation of Analog Multimeter?
2. Explain the operation of DC Voltmeter.
3. Write about the piezoelectric Transducer.
4. How does Resistive transducer work?
5. What are the limitations of seven segment Displays.
6. What are the characteristics of Display devices?
7. Explain the structure of clinical thermometer with diagram
8. How does a CT scan work?
9. What is PLC? Explain the over view of PLC system.
10. What are the basic elements & Functions of DCS?

Part B (5x10=50 Marks)

Answer the following

11. Draw and explain about the Block diagram of Digital Multimeter.
(OR)
12. (a) Explain the Over view of Analog Instrument .
(b) Explain the difference between Analog and Digital instrument.
13. What is LVDT? Explain its construction and operation.
(OR)
14. Draw the Block diagram of Fiber Optic sensor and explain the function of each block.
15. What is seven segment Display? And explain the Common Anode and Common Cathode Configuration.
(OR)
16. Describe the construction and working of LCD Display.
17. Explain the principle and working of Sphygmomanometer.
(OR)
18. How does Ultra Sound Scan Work? And Mention its applications.
19. Explain the Traffic light Control system using PLC Ladder Logic with a neat diagram.
(OR)
20. Explain the Architecture and working of DCS.

SRI VENKATESWARA UNIVERSITY:TIRUPATI
Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: ELECTRONICS
4 Year B.Sc.,-Semester-V
Course 6B: Embedded systems design
(Skill Enhancement Course (Elective),3+2Credits)
Max. Marks: Theory: 100+Project: 50

Learning outcomes: students after successful completion of the course will be able to

- Gain good knowledge on embedded systems and their implementation in practical applications.
- Work effectively as a member or leader on a technical team.
- Maintain commitment to quality, timelines and continuous improvement.
- Acquire good knowledge of various communication protocols and their implementation

UNIT 1: (10Hrs)

Introduction to Embedded Systems:

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

UNIT 2: (15Hrs)

Custom Single Purpose Processors – 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: PCIBUS and ARMBUS. Wireless Protocols: IrDA, Bluetooth, and IEEE802.11.

TEXT BOOKS:

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

REFERENCES:

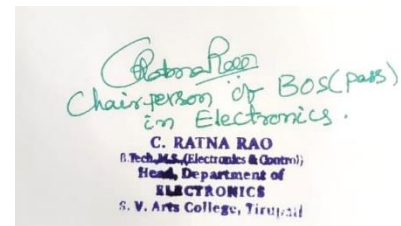
1. An Embedded Software Premier – David E. Simon , PEARSON
2. Education Embedded/real-time systems - DR. K.V.K.K. Prasad, dream tech
3. The art of programming Embedded systems , Jack G. Ganssle, academic press
4. Intelligent Embedded systems , Louis L. Odette , Adison Wesly , 1991

ELECTRONICS LAB-6B

Embedded systems

Project work (50 marks)

- Students should carry out project work in the laboratory either individually or in groups.
- In the end they have to submit a report of the work done and working model to the department.
- Each student should give a presentation of his work in front of internal/external examiners.



SRI VENKATESWARA UNIVERSITY:TIRUPATI
Domain Subject: ELECTRONICS
4 Year B.Sc.,-Semester-V
Course 6B: Embedded Systems Design
Model Question Paper
(w.e.f 2022-23)

Time: 3 hours

Max. Marks: 75

Part-A(5 X5 =25Marks)

Answer any FIVE of the following

1. What are the components of an embedded hardware system?
2. Explain the design challenges of embedded systems.
3. Explain various steps to design a custom single-purpose processor.
4. Explain sequential logic circuit design.
5. Describe about the testing on your host machine.
6. Briefly explain the operation of a general-purpose processor.
7. Explain about the LCD controllers.
8. Explain the working of Real-Time Clocks in embedded systems.
9. Write a short note on the CAN protocol.
10. Explain the working of IEEE - 802.11 protocol for wireless communication.

Part B (5x10=50 Marks)

Answer the following

11. Draw the block diagram of an embedded system. Explain the features of Embedded Systems.
(OR)
12. Explain the various technologies involved in designing an embedded system.
13. Explain (a) Combination logic and (b) Sequential logic circuits
(OR)
14. Explain in detail about RT Level custom single purpose processor.
15. Explain in detail about embedded software development tools.
(OR)
16. Describe about the Getting Embedded Software into the Target System.
17. Define and explain Universal Asynchronous Receiver Transmitter (UART).
(OR)
18. Explain the working of Analog to Digital Converter for embedded systems.
19. Distinguish between parallel and serial communication Principles. Explain I2C Serial Protocol.
(OR)
20. Write a short note on (a)PCI BUS and (b) ARM BUS

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Semester-wise Revised Syllabus under CBCS, 2020-21

Domain Subject: **ELECTRONICS**

4 Year B.Sc.,-Semester-V

Course 7B: Consumer Electronics

(Skill Enhancement Course (Elective), 3+2 Credits)

Max. Marks: Theory: 100+ Practical: 50

Learning outcomes:

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

Unit – I (12hrs)

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 (12hrs)

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 (12hrs) -

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 (12hrs)

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 (12hrs)

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.

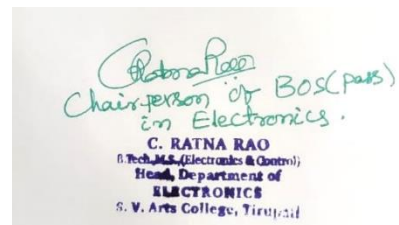
TEXTBOOKS:

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

ELECTRONICS LAB-7B
Consumer Electronics
(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.



SRI VENKATESWARA UNIVERSITY:TIRUPATI
Domain Subject: ELECTRONICS
4 Year B.Sc.,-Semester-V
PAPER- 7B:CONSUMER ELECTRONICS
Model Question Paper
(w.e.f 2022-23)

Time: 3 hours

Max. Marks: 75

Part A (5 X 5 = 25 Marks)

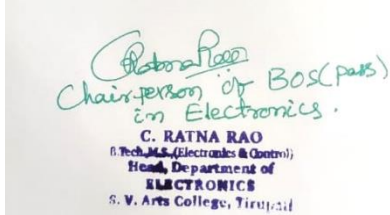
Answer any FIVE of the following:

1. Explain the microwave oven safety instructions.
2. Mention the types of a microwave oven?
3. Explain the features of the washing machine.
4. Explain the electronic controller for washing machine.
5. Explain the working of the Air Conditioning system.
6. What is a Unitary Air Conditioning system?
7. How servicing the electronic Calculators.
8. What is facsimile machine? And give the two uses of it.
9. Explain the barcode scanner system.
10. How transfer the fund using ATM?

Part B (5x10=50 Marks)

Answer the following:

11. Draw the block diagram of the microwave oven and explain the function of each block.
(OR)
12. Explain the LCD timer with alarm in the washing machine.
13. What is FUZZY logic washing machine?
(OR)
14. Explain the hardware & Software details of washing machine.
15. Explain the different components of Air-Conditioning system.
(OR)
16. Explain the working of split air conditioner.
17. Draw the block diagram of Digital Clock and explain it.
(OR)
18. Describe the Internal Organization of a Calculator and explain the servicing of it.
19. What is Network? Explain its Online Ticket Reservation procedure.
(OR)
20. Explain the details about Digital cable TV.



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