

# **ELECTRONICS TECHNOLOGY (Code No – 820)**

## **JOB ROLE: INSTALLATION TECHNICIAN**

**SESSION 2019-2020**

**CLASS XI**

### **1. Introduction**

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After successfully completing the two year of senior secondary vocational course, the student would have acquired relevant appropriate and adequate technical knowledge to gether with the professional skills and competencies in the field of Electronics so that he/she is properly equipped to take up gainful employ mention this Vocation.

### **2. Course Objectives**

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#### **A. Understanding of**

1. The relevant basic concept sand principles in basic science subjects (Physics, Chemistry and Mathematics) so that he/she is able to understand the different vocational subjects.
2. The basic concepts in engineering drawing.
3. The concepts, principles of working of basic electronic devices and circuits.
4. The knowledge of testing procedure of components and circuits by making use of different test instruments.
5. The procedure of making P.C.B.
- (f) The concepts and principles used in Radio/Audio/Video Systems and Communication devices and its maintenance.

#### **B. Adequate Professional Skills and Competencies in**

- (a) Testing different electronic components.
- (b) Testing the performance of electronic circuits.
- (c) Locating the fault at component level and at the stage level.

#### **C. A Healthy and Professional Attitude so that he/she has**

- (a) An analytical approach while working on a job.
- (b) An open mind while locating /rectifying faults.
- (c) Respect for working with his / herown hands.
- (d) Respect for honesty, punctuality and truthfulness.

### 3. Curriculum

This course is a planned sequence of instructions consisting of Units meant for developing employability and Skills competencies of students of Class XI opting for Skills subject along with general education subjects.

Theory	60 marks
Practical	40 marks
<b>Total Marks</b>	<b>100 marks</b>

The unit-wise distribution of Periods and marks for Class XI is as follows:

CLASS XI (SESSION 2019- 2020)				
	Units	No. of Periods for Theory and Practical 260		Max. Marks for Theory and Practical 100
<b>Part A</b>	<b>Employability Skills</b>			
	Unit 1: Communication Skills – III	10		<b>10</b>
	Unit 2: Self-management Skills – III	10		
	Unit3: Information and Communication Technology Skills – III	10		
	Unit 4: Entrepreneurial Skills – III	15		
	Unit 5: Green Skills – III	05		
	<b>Total</b>	<b>50</b>		<b>10</b>
<b>Part B</b>	<b>Skills</b>	<b>Theory Periods</b>	<b>Practical Periods</b>	
	Unit 1: Overview of Atom, Sub-Atomic Particles and CRO	16	10	05
	Unit 2: Voltage and Current	24	20	10
	Unit 3: Basics of Semiconductor	32	20	15
	Unit 4: Bipolar Junction Transistor	24	20	10
	Unit 5: Transistor Amplifier and Applications	24	20	10
	<b>Total</b>	<b>120</b>	<b>90</b>	<b>50</b>
<b>Part C</b>	<b>Practical Work</b>			
	Practical Examination			15
	Written Test			10
	Viva Voce			05
	<b>Total</b>			<b>30</b>
<b>Part D</b>	<b>Project Work/Field Visit</b>			
	Practical File/Student Portfolio			10
	<b>TOTAL</b>			<b>10</b>
	<b>Grand Total</b>			<b>100</b>

## 4. CONTENTS

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### CLASS XI (SESSION 2019-2020)

#### PART A: EMPLOYABILITY SKILLS

Units	
1.	Communication Skills –III
2.	Self-management Skills –III
3.	Information and Communication Technology Skills – III
4.	Entrepreneurial Skills – III
5.	Green Skills – III
<b>Detailed curriculum of Employability Skills is available separately</b>	

#### Part B: Skills

##### 1. Overview of Atom, Sub-Atomic Particles and CRO

1. Brief History of Electronics.
2. Atom and its elements, Bohr Atomic model, Atomic energy level.
3. Electron, Force, Field intensity, Potential, Energy, current, current density, Ionization potential.
4. Electric field, Magnetic field, Motion of charged particles in electric and magnetic field.
5. Overview of CRO, Electronic and Magnetic deflection in CRO, Applications.

##### 2. Voltage and Current

1. Resistance, Ohm's law, V-I Characteristics, Resistors, Capacitors, Inductors.
2. Voltage and Current sources, Symbols and Graphical representation, Conversion of current and voltage sources.
3. Overview of AC, DC, Cells and Batteries, Energy and Power.

##### 3. Basics of Semiconductor

1. Semiconductor materials, Energy band structure of Insulators, Metals and Semiconductors, Energy gap, Field and Photo-electric emission.

2. Intrinsic & Extrinsic semiconductor, N-type and P-type semiconductor, Drift current, Diffusion current and Total current, Mobility of charges, Effects of temperature on Conductivity of semiconductor.
3. PN junction diode, depletion layer, potential barrier, Forward & Reverse bias, V-I Characteristic, Effects of temperature, Resistance levels, Breakdown in Junction diode, Zener diode, Photo diode, LED, Types and applications of diode.
4. Diode as a rectifier, Half wave and full wave rectification, Voltage multipliers, Zener diode Regulator.
5. Special information – (Introduction to Filters, Clippers, Clampers).

#### **4. Bipolar Junction Transistor**

1. Construction and operation of NPN and PNP transistors, Biasing of BJT.
2. CB, CE and CC configuration, Characteristics and transistor parameters for CB, CE, CC configuration.
3. Introduction to FET, JFET, MOSFET, CMOS and VMOS, Characteristics of various transistors, Comparison of various transistors.

#### **5. Transistor Amplifier and Applications**

1. Introduction, Single and Multi stage amplifiers, General amplifier characteristics, Feedbacks in amplifier.
2. Introduction to Oscillators, Multi-Vibrators and Signal generator.
3. Special information - (Introduction to Thyristors, PNP diode, SCR, LASCR, DIAC, TRIAC).

## **5. TEACHING ACTIVITIES**

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The teaching and training activities have to be conducted in classroom, laboratory/ workshops and field visits. Students should be taken to field visits for interaction with experts and to expose them to the various tools, equipment, materials, procedures and operations in the workplace. Special emphasis should be laid on the occupational safety, health and hygiene during the training and field visits.

### **CLASSROOM ACTIVITIES**

Classroom activities are an integral part of this course and interactive lecture sessions, followed by discussions should be conducted by trained vocational teachers. Vocational teachers should make effective use of a variety of instructional or teaching aids, such as audio-video materials, colour slides, charts, diagrams, models, exhibits, hand-outs, online teaching materials, etc. to transmit knowledge and impart training to the students.

### **PRACTICAL WORK IN LABORATORY/WORKSHOP**

Practical work may include but not limited to hands-on-training, simulated training, role play, case based studies, exercises, etc. Equipment and supplies should be provided to enhance hands-on learning experience of students. Only trained personnel should teach specialized techniques. A training plan that reflects tools, equipment, materials, skills and activities to be performed by the students should be submitted by the vocational teacher to the Head of the Institution.

## 6. ORGANISATION OF FIELD VISITS/EDUCATIONAL TOURS

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In field visits, children will go outside the classroom to obtain specific information from experts or to make observations of the activities. A checklist of observations to be made by the students during the field visits should be developed by the Vocational Teachers for systematic collection of information by the students on the various aspects. Principals and Teachers should identify the different opportunities for field visits within a short distance from the school and make necessary arrangements for the visits. At least three field visits should be conducted in a year.

## 7. LIST OF EQUIPMENT AND MATERIAL

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1. Resistance - various values/sizes
2. Condensers - various values/sizes
3. Transformer such as Battery Eliminator mains and Battery charger
4. Side cutting insulated pliers – 15 cm
5. Long Nose insulated pliers 15 cm
6. Wire cutter, spring type
7. Screw driver set – 10 cm, 15 cm, 20 cm
8. Soldering Iron – 35 W/220 V, Solder Wire – 60, 40 and soldering Iron Stand
9. Tinned Copper Wire
10. VARIAC Single Phase
11. Wire Stripper
12. Steel Scale
13. Combination Pliers
14. Crimping Tools
15. Electronic Tool Kit
16. Analog Oscilloscope: Oscilloscope 30 Mhz Dual Trace
17. Digital Multimeter 4 & ½ Digits
18. Function Generator 0.3 Mhz To 3 Mhz
19. DC regulated Power Supply (30 V/5A)
20. Frequency Counter 0.1 Hz to 1 GHz
21. Universal IC Tester, Digital IC upto 40 pins
22. Three Terminal Voltage Regulator Trainer Board
23. Diode & Zener diode Characteristics Trainer Board
24. Rectifier and Filter Trainer Board
25. Transistors Characteristics Trainer Board (CE,CB,CC)
26. TV pattern Generators
27. Telephone Trainer Kit
28. Mobile Communication Training System
29. Communication Simulation Software
30. Fax machine trainer
31. Mobile Phone Trainer
32. Single Phase Half Wave Control Rectifier Using SCR Board
33. UPS Trainer
34. Temperature Oven (0-200 DegreeC)

35. Different Microphones & Loudspeaker (for study of frequency response of microphone)
36. Microwave Oven
37. Colored Television Demonstration kit
38. CD/DVD Player Trainer Kit
39. Stereo Cassette player demonstration cum trainer
40. Facsimile Machine
41. DTH System
42. 8 bit digital multiplexer
43. 1:8 line de-multiplexer
44. Multiplex two BCD numbers to seven segment display
45. 3 bit asynchronous up-counter 3 bit synchronous down counter
46. Universal Shift Registers having SISO, SIPO, PIPO, PISO
47. Encoder/decoder trainer
48. Digital IC Testers
49. Digital IC Power Supplies (+/- 5V/1A, +/-12V/1A/+/-15V, 1A)
50. GSM trainer kit
51. CDMA trainer kit
52. Digital Trainer Kit with following on board facility:
  - Breadboard,
  - 16 Nos. of input toggle switches,
  - Sixteen nos. of LED output provision,
  - Fixed +5V@1A and variable  $\pm 15V@500mA$  power supply,
  - Pulsar switch for clock input,
  - Variable frequency clock signal (1Hz to 1KHz),
  - Digital voltmeter
  - Seven segment display
53. TTL IC 7400(NAND), 7402 (NOR), 7404(NOT), 7408(AND), 7432(OR), 7486(XOR)  
 TTL IC 7446 (Common anode decoder driver),  
 IC 7448 (Common cathode decoder driver),  
 seven segment display (both common anode:  
 MAN 3910 or equivalent and common cathode:  
 MAN 3940 or equivalent).
54. 8085 microprocessor based microprocessor trainer kit.

## 8. PRACTICAL GUIDELINES

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1. Study of current and voltage measurement using Ammeter and Voltmeter.
2. Study of current and voltage measurement using Galvanometer.
3. Study of current, voltage and resistance measurement using of Multi-meter
4. Study of voltage amplifier.
5. Study of power amplifier.
6. Study of working principle of Signal Generator and measurement of amplitude, time period and frequency of signal using Oscilloscope.
7. Study of V-I Characteristic of Diode.
8. Study of V-I Characteristic of Zener Diode. And use of Zener Diode as voltage regulator.
9. Study of Half wave rectifier with and without filter circuit.

10. Study of Full wave rectifier with and without filter circuit.
11. Study CE configuration for NPN and PNP transistors and measurement of voltage and current gain.
12. Study CB configuration for NPN and PNP transistors and measurement of voltage and current gain.
13. Study CC configuration for NPN and PNP transistors and measurement of voltage and current gain.
14. Study of working of single layer PCB manufacturing
15. Study of working of double layer PCB manufacturing.
16. Design of 7 segment display using LED and bread board.