

ELECTRONICS TECHNOLOGY (Code No – 820)

JOB ROLE: INSTALLATION TECHNICIAN

SESSION 2019-2020

CLASS XII

1. Introduction

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

2. Course Objectives

A. Understanding of

1. The relevant basic concepts and principles in basic science subjects (Physics, Chemistry and Mathematics) so that he/she is able to understand the different 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 / her own 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 XII opting for Skills subject along with general education subjects.

Theory	60 marks
Practical	40 marks
Total Marks	100 marks

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

CLASS XII (SESSION 2019-2020)				
	Units	No. of Periods for Theory and Practical 260		Max. Marks for Theory and Practical 100
Part A	Employability Skills			
	Unit 1: Communication Skills . IV	10		10
	Unit 2: Self-management Skills . IV	10		
	Unit 3: Information and Communication Technology Skills . IV	10		
	Unit 4: Entrepreneurial Skills . IV	15		
	Unit 5: Green Skills . IV	05		
	Total	50		10
Part B	Skills	Theory Periods	Practical Periods	
	Unit 1: Basic Occupational Safety and Precautions	30	10	15
	Unit 2: Microphones and Loudspeakers	15	10	05
	Unit 3: Recorders	25	20	10
	Unit 4: TV System	30	25	10
	Unit 5: Modern Appliances	20	25	10
	Total	120	90	50
Part C	Practical Work			
	Practical Examination			15
	Written Test			10
	Viva Voce			05
	Total			30
Part D	Project Work/Field Visit			
	Practical File/Student Portfolio			10
	Total			10
	Grand Total			100

4. CONTENTS

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PART A: EMPLOYABILITY SKILLS

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

PART B: SKILLS

- 1. Basic Occupational Safety and Precautions**
- 2. Microphones and Loudspeakers**
 1. Construction, working principle and frequency response of Carbon Microphone, Variable Reactance Microphone, Capacitance Microphone, Piezo-Electric Microphone, Moving Coil Microphone.
 2. Frequency ranges of musical instruments, Intensity and Dynamic Range, Constructions and working principles of Moving Coil Loudspeaker, Impedance and Power Level of loudspeaker, Frequency characteristics of Practical Loudspeakers: Woofer, Tweeter, Squawker, and Loudspeaker Enclosure.
- 3. Recorders**
 1. Analog and digital sound recording, Disk recording and reproduction, working principle with block diagram of disk recording and reproduction.
 2. Principle of magnetic recording and playback, Requirement of bias, Working principle with block diagram of a tape recorder system.
 3. Principle of optical recording, CD/ DVD manufacturing and recording, CD/ DVD player system, Advantages/ Disadvantages.
 4. Steps for Fault finding & Analysis.
- 4. TV System**
 1. Working principle with block diagram of TV transmitter and receiver, Brief description with circuit diagram: TV Tuner, Video IF stage, Sound stage, Picture tube & its associated circuit, Synchronizing circuits, Horizontal & vertical deflection circuits, Remote control of a TV receiver, Idea of bandwidth, blanking and synchronization pulses, modulation scheme, monochrome system, extension of colour transmission.
 2. Channel and cable type TV system, Head end processor, Trunk & cable distribution system with block diagram, Scrambling.
 3. Introduction to LCD and LED TV systems, Introduction to high definition systems.
 4. Steps for Fault finding & Analysis.
- 5. Modern Appliances**
 1. Working principle and block diagram of following:
Microwave oven, Telephone, Fax machine, Printers, Scanners.
 2. Steps for Fault finding & Analysis.

5. TEACHING ACTIVITIES

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 teachers. 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 teacher to the Head of the Institution.

SKILL ASSESSMENT (PRACTICAL)

Assessment of skills by the students should be done by the assessors/examiners on the basis of practical demonstration of skills by the candidate, Practical examination allows candidates to demonstrate that they have the knowledge and understanding of performing a task. This will include hands-on practical exam and viva voce. For practical, there should be a team of two evaluators. The same team of examiners will conduct the viva voce.

Project Work (individual or group project) is a great way to assess the practical skills on a certain time period or timeline. Project work should be given on the basis of the capability of the individual to perform the tasks or activities involved in the project. Projects should be discussed in the class and the teacher should periodically monitor the progress of the project and provide feedback for improvement and innovation. Field visits should be organised as part of the project work. Field visits can be followed by a small-group work/project work. When the class returns from the field visit, each group might be asked to use the information that they have gathered to prepare presentations or reports of their observations. Project work should be assessed on the basis of practical file or student portfolio.

Student Portfolio is a compilation of documents that supports the candidate's claim of competence. Documents may include reports, articles, photos of products prepared by students in relation to the unit of competency.

Viva voce allows candidates to demonstrate communication skills and content knowledge. Audio or video recording can be done at the time of viva voce. The number of external examiners would be decided as per the existing norms of the Board and these norms should be suitably adopted/adapted

as per the specific requirements of the subject. Viva voce should also be conducted to obtain feedback on the student's experiences and learning during the project work/field visits.

6. ORGANISATION OF FIELD VISIT/EDUCATIONAL TOURS

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 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

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 Degree C)
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,
Pulser 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

1. Assembly study and fault finding of an audio amplifier.
2. Assembly, study and fault finding of a graphic equaliser.
3. Study working, assembly & fault finding of Colour TV.
4. Study working, assembly & fault finding of LCD TV.
5. To trace the fault in the following panel controls and correct them:
 - a. Volume control.
 - b. Brightness control.
 - c. Contrast control.
 - d. Vertical hold control.
6. To trace the following stages of T.V. set:
 - a. Tuner.
 - b. MF stage.
 - c. Video detector.
 - d. Video amplifier.
 - e. Sound I.T.

- f. Sound output stage.
- g. Syne separator.
- h. Vertical oscillator.
- i. Horizontal oscillator.
- j. Line Driver Stage.
- k. Line output transformer.
- l. Power supply.

7. To find fault for the following defects:

- a. No picture no sound.
- b. Sound present, picture missing.
- c. Picture rolls vertically.
- d. Picture tears(Horizontal oscillator).
- e. Faults in tuner/IF/power supply.

8. Study working, assembly & fault finding of tape recorder system.

9. Study working, assembly & fault finding of CD/DVD player system.

10. Study working, assembly & fault finding of Printer.

11. Study working, assembly & fault finding of Scanner.

12. Study working, assembly & fault finding of Microwave oven.

13. Study working, assembly & fault finding of Telephone.

14. Study working, assembly & fault finding of Fax Machine.

15. Study working, assembly & fault finding of UPS system.

16. Study working, assembly & fault finding of DTH kit.

GUIDELINES FOR EXAMINERS

1. Examiner should check-up at least one result of the examinee.
2. As far as possible each examinee should be given separate experiment.
3. Main emp has is should be given on the evaluation of work done, professional competency, workmanship and finish etc.
4. The object of Viva-voce should be to ascertain the depth of knowledge and understanding of the student. Questions asked should pertain to experiment per formed by the student as well as the experiments.
5. Each student may be allotted two experiments from the list and he/she may perform any one out of the two.

GENERAL INSTRUCTIONS TO THE STUDENTS/CANDIDATES

Note: Before starting the practical, student should submit the connection diagram along with the list to equipment to the examiner.

1. Each student should check-up the material/tools and equipments as per the requirement of the examination.
2. Each student should make himself/herself clear in understanding the question paper fully before its commencement.
3. Any student who finds any problem handling the machine/equipment should immediately contact his/her Invigilator/Examiner.
4. Each student must do all the required operations himself/herself without the help of other students.
5. Each student should bear in mind the time allotted to him/her so that he/she may finish his/her jobs within the stipulated time.