

Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in Electronic Science

(Faculty of Science & Technology)

Electronic Equipment Maintenance (Vocational)

Choice Based Credit System (CBCS) Syllabus

To be implemented from Academic Year 2019-2020

Title of the course: B. Sc. Electronic Equipment Maintenance (Vocational) (VOC-EEM)

Preamble:

Electronic equipments have been used in each and every field. It includes home and consumer electronics appliances such as smart phone, television, cooling and heating appliances, etc. There is a need of skilled manpower for maintenance of equipments. The objective of vocational course is to teach the technical knowledge of the equipments. The main goal of this course is that after completion of study of the equipments the students should become successful entrepreneur.

Eligibility:

First Year B.Sc.: Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

Titles of Papers and Scheme of Study Evaluation

F.Y.B.Sc. Electronic Equipment Maintenance (Vocational) (VOC-EEM)

Semester	Paper Code	Paper	Paper title	Credits	Lectures/Week			Evaluation		
					Th	Tut	Pr.	CA	UE	Total
I	VOC-EEM-111	I	Maintenance of domestic equipments-A (Heating Appliances)	2	3	-	-	15	35	50
	VOC-EEM-112	II	Elements of electronic equipment design-A (PCB techniques)	2	3	-	-	15	35	50
	VOC-EEM-113	III	Practical course-I	1.5	-	-	3.15	15	35	50
II	VOC-EEM-121	I	Maintenance of domestic equipments-B (Cooling Appliances)	2	3	-	-	15	35	50
	VOC-EEM-122	II	Elements of electronic equipment design-B (Open source tools)	2	3	-	-	15	35	50
	VOC-EEM-123	III	Practical course-II	1.5	-	-	3.15	15	35	50

SEMESTER-I

Paper-I: VOC-EEM-111: Maintenance of domestic equipments-A (Heating Appliances) (2 credits, 36 lectures)

Unit-I : Geyser (10 lectures)

Construction and working, parts and manufacturing process, types.

Common faults and their troubleshooting:

Dripping geyser overflow, overheating, steam or hot water escaping from overflow, water leaking through the ceiling, no hot water, water not hot enough, poor hot water pressure.

Unit-II : Induction cooker (10 lectures)

Construction and working, parts and manufacturing process, types.

Common faults and their troubleshooting:

Cooker fuse blown, cooker buttons not working, cooktop shuts off while cooking, food not get cooked or heated properly, overheating and uneven heating, display keep flashing, weird noises–crackling, fan noise, humming sound, clicking.

Unit- III : Microwave Oven (16 lectures)

Working, raw material and manufacturing process, types

Common faults and their troubleshooting:

Microwave does not heat, runs then stops, buttons do not work, plate do not spin, bulb does not turn ON during operation, sparking inside, shuts OFF after few seconds

References:

1. Electronic instruments and systems: Principles, maintenance and troubleshooting by R. G. Gupta
Tata McGraw Hill
2. Modern electronic equipment: Troubleshooting, repair and maintenance by Khandpur, Tata
McGraw Hill
3. Electronic fault diagnosis by G. C. Loveday, A. H. Wheeler publishing
4. www.madehow.com

Paper-II: VOC-EEM-112: Elements of electronic equipment design-A (PCB Techniques) (2 credits, 36 lectures)

Unit I: Artwork design (20 Lectures)

Schematic, Layout – Parts of layout, Artwork, Study of layout design software, design of artwork, Design rules: Pads and track size, footprint, netlist, copper pour, single and double sided, PTH and footprint for surface mount devices, Gerber files.

Unit II: PCB manufacturing techniques (8 Lectures)

Manual procedure, computerized procedure, screen printing technology, tinning, masking, silk-screen.

Unit III: Soldering techniques (8 Lectures)

Tools required for soldering: soldering gun, solder material, flux, soldering stand, hot air gun, SMD soldering station.

Soldering of through hole components and SMD components

Reference books:

1. Kraig Mitzner, “Complete PCB Design Using OrCAD Capture and Layout,” Elsevier, Amsterdam,
2. Walter C Bosshart, “Printed Circuit Board Design and Technology”, 1st ed., McGraw Hill Education

VOC–EEM–113: Practical course–I (1.5 Credits)

Number of Practicals: 10

Section A: List of Experiments (Any 05)

1. Demonstration of induction cooking.
2. Identification of parts of induction cooker.
3. Troubleshooting of common faults in induction cooker.
4. To compare induction cooker with transformer
5. Design and implementation of induction cooker.
6. Precautions in using an induction cooker
7. Preventive maintenance of induction cooker
8. Demonstration of microwave cooking.
9. Identification of different parts of microwave oven.
10. Heating performance assessment of microwave oven.
11. Fault finding and troubleshooting of microwave oven.
12. Microwave oven experiments with metal and light source.
13. To measure the speed of light using microwave oven.
14. Identification of parts of household Geyser.
15. Troubleshooting of common faults in Geyser.
16. Preventive maintenance of Geyser.

Section B: List of Experiments (Any 05)

1. Installation and study of PCB layout software.
2. Study of different parts of PCB layout
3. Design of Single layer PCB layout.
4. Design of Double layer PCB layout.
5. Development of PCB in the laboratory.
6. Development of PCB using screen printing technology.
7. Study of SMD soldering station and its use for soldering of discrete SMD components.
8. Study of hot air gun and its use for de-soldering and soldering of SMD components.
9. Study of mobile repairing soldering work station.

SEMESTER-II

Paper-II: VOC-EEM-121: Maintenance of domestic equipments-B (cooling Appliances) (2 credits, 36 lectures)

Unit-I Refrigerator (24 Lectures)

Working, raw material and manufacturing process, electrical wiring diagram, types of refrigerator.

Common faults and their troubleshooting:

fridge not cooling, fridge not defrosting, leaking water, freezing food light not working, freezer is cooled but fridge stays warm, dead refrigerator, not enough cooling, keeps running, leakage, makes noise.

Replacement procedure for: seal (gasket), evaporator fan motor, PTC relay, thermostat, compressor, bulb.

Unit-II Air Conditioner (12 Lectures)

Working, raw material and manufacturing process, electrical wiring diagram, types.

Common Faults and their troubleshooting:

Faults in following parts of AC: Filter, thermostat, refrigerant leaks, breakers, capacitors, compressor, evaporator coils, condenser coils, worm contactor. General faults :AC unit has an odour, shuts ON and OFF repeatedly, does not blow cold air, repeatedly tripping a circuit breaker, indoor unit is leaking water inside the room, outdoor unit is making an unusually loud sound, room is not getting cold enough, AC not turning ON.

References:

1. Electronic instruments and systems: Principles, maintenance and troubleshooting by R. G. Gupta
Tata McGraw Hill
2. Modern electronic equipment: Troubleshooting, repair and maintenance by Khandpur, Tata
McGraw Hill
3. Electronic fault diagnosis by G. C. Loveday, A. H. Wheeler publishing
4. www.madehow.com

Paper-II: VOC-EEM-122: Elements of electronic equipment design-B (open source tools) (2 credits, 36 lectures)

Unit I: Open source development boards (18 Lectures)

Commonly available development boards– Arduino/ESP32.

Integrated development environment (IDE) for programming the development boards.

Interfacing of commonly available devices–LED, LCD, keypad, Bluetooth.

Unit II: Open source mobile operating system for electronics (18 Lectures)

Android programming for electronics– Introduction, Android studio, Installation, Google Map tools, start service on boot, Bluetooth connection, Multi touch, stack view, and stack Pager, development of mobile App for control of electronic devices.

Reference books:

1. Niel Kolban, Kolban's book on ESP32, (2017)
2. Chiryssa Alifery, "Android programming cookbook", Exelixis media (2016)
3. Michael Margolis, "Arduino Cookbook", O'Reilly

Semester II

VOC–EEM– 123 Practical course–II (1.5 Credits)

Number of Practicals: 10

Section A: List of Experiments (Any 05)

1. Study of various tools used in Refrigeration & Air conditioning.
2. Study of Domestic or Household Refrigerator.
3. Experiment on organisation of different food materials in the refrigerator.
4. Tracing of electrical wiring diagram of Refrigerator.
5. Troubleshooting of common faults in refrigerator.
6. Study of Refrigeration Compressor
7. Study of leak detection, and Charging of Refrigerants procedure
8. Study of Refrigerating Controls
9. Study of different types of refrigerants
10. Identification of parts of air conditioner
11. Troubleshooting of common faults in air conditioner.

Section B: List of Experiments (Any 05)

1. Introduction to open source Arduino
2. Study of microcontroller development board(MDB): Arduino/ESP32
3. LED interfacing with MDB
4. Bluetooth interfacing with MDB
5. GSM interfacing with MDB.
6. Interfacing of LCD and keypad with MDB
7. Light Dimmer by using PWM of MDB
8. Installation of Android Studio
9. Writing simple programs in android
10. Development of mobile App for Bluetooth controlled LED.