

Deccan Education Society's  
**FERGUSON COLLEGE, PUNE**  
**(AUTONOMOUS)**

**SYLLABUS UNDER AUTONOMY**  
**FIRST YEAR B.Sc.**  
**VOCATIONAL ELECTRONIC**  
**EQUIPMENT MAINTENANCE (EEM)**

**SEMESTER - I**

**Academic Year 2016-2017**

## F.Y. B.Sc.

### (Vocational Electronic Equipment Maintenance- EEM)

Particulars	Paper code	Title of Paper	No. of Credits
F.Y. Semester I	EEM1101	PCB design, fabrication and assembly	2
	EEM1102	Solar-LED lighting products	2
	EEM1103	PCB design & solar lighting lab	2
F.Y. Semester II	EEM1201	Installation, repair and maintenance of Home appliances	2
	EEM1202	Computer hardware assembly / Installations	2
	EEM1203	Maintenance of Home Appliances + Computers	2

Fergusson College, Pune

## Vocational Electronic Equipment Maintenance

### **Proposed Curriculum under Autonomy**

#### **Introduction**

Vocational Electronic Equipment Maintenance(Voc. EEM) was started in Fergusson College in the year 2000 to train students in the area of maintenance of Electronic equipment. This course was initially financed by the UGC, Delhi for 5 years. Later on this course is run by the college on self-financed basis till date.

The employment in the Electronics industry is estimated to grow phenomenally. Hence to facilitate skill **development in ESDM** (Electronic System Design & Manufacturing) **sector** focusing on students/unemployed youth to increase their employability to work in 'Manufacturing' and 'Service support'.

Under the aegis of '**Digital India**' programme launched by Hon'ble Prime Minister, the department has approved a Scheme for "**Skill Development in ESDM for Digital India**" to cover all the States/UTs of the country in order to facilitate creation of an eco-system for development of ESDM sector in the entire country for facilitating skill development in ESDM sector.

Looking at the changing trend, college has decided to modify and tailor the courses in line with NVEQF(National Vocation Education Qualification Framework) / NSQF(National Skill Qualification framework). The National Skills Qualifications Framework (NSQF) is a competency-based framework that organizes all qualifications according to a series of *levels of knowledge, skills and aptitude*. In this program, training courses identified by Electronics Sector Skills Council, Telecom Sector Skills Council and NIELIT will be implemented. The courses identified are:

#### **Features:**

- 1. Generate skilled workforce in** all sectors and areas of Electronics Design, manufacturing and service sector.
- 2. Short duration, focused and modular programs** allow for quick and effective delivery of skills training. This allows a person to become productive relatively quickly at younger age. The modular approach also means that he can add on to his portfolio of skills for vertical and horizontal progression. At the same time the content is focused to allow for

dissemination of only relevant skill. The duration is decided taking into account the objectives and content of the constituent programs. Amongst other things it would be based on Employer-Employee needs, availability of Infrastructure and Equipment, Characteristics of the Training Content, etc.

3. **Courses of varied sector skill requirements**, depending on the skill and the requirements at particular level.
4. The **practical hands on** skills.
5. The **delivery of the program is flexible**, it could be one hour, half day, full day or week end programs. This would again be decided on availability of candidate's spare time, availability of training infrastructure and spare capacities, etc.
6. **Training could be delivered in association with industry, Training Organizations, Services**, In addition, for practical training at R&D laboratories, and industries could be used as Training Sites for skill enhancement, wherever required.

#### **FYBSc**

1. *PCB design and assembly*
2. *Solar-LED lighting products*
3. *Installation, repair and maintenance of Home appliances*
4. *Computer hardware assembly/ installation*

#### **SYBSc**

5. *Installation and maintenance of Consumer Electronic Products*
6. *Computer Networking – installation and maintenance*
7. *Repair and maintenance of Power Supply, inverter and UPS*
8. *Security system installation and maintenance*

#### **TYBSc**

9. *Repair and maintenance of Industrial instrumentation and Automation system*
10. *Installation, repair and maintenance of communication equipment*
11. *Computer aided product design*
12. *Robotics and automation systems – installation and Maintenance*

# **F.Y. B.Sc. Semester I**

## **EEM paper -1(EEM1101): PCB design, fabrication and assembly**

**[Credits-2: Lectures-36]**

1. Basics of PCB

Need, Classification, Electronics components (discrete, ICs, SMDs) – symbols, dimensions, packages, Connectors and cables.

2. Layout planning and design

Drawings and diagrams, General PCB design considerations, Mechanical design considerations, Electrical considerations, Components placement rules, Layout design

3. Artwork generation and automation

Manual artwork, film master preparations, CAD / CAM tools, design automation

4. Image transfer techniques

Cleaning, screen printing, pattern transfer techniques, photo printing,

5. Plating techniques, solder masks, etching techniques,

6. Mechanical operations – cutting methods, punching, drilling, assembly, soldering

7. PCB technology trends: Multilayer and flexible PCBs

**Reference:**

1. Printed circuits boards, R. S. Khandpur, Tata Mc Graw Hill Publication (2005)
2. Printed circuits handbooks, Clyde F. Coombs and Happy T. Holden, Mc Graw Hill (2016)
3. Printed circuit board: design and technology, Walter Bosshart, Tata McGraw Hill (2008)
4. Printed Circuit boards: Designer's reference: Christopher Robertson, Prentice Hall (2004)

## **F.Y. B.Sc. Semester I**

### **EEM Paper-2 (EEM1102): Solar-LED lighting products**

**[Credits-2: Lectures-36]**

1. The solar resource, Solar energy
2. Solar PV cells and Modules  
Solar cell -Structure, characteristics,  $I_{sc}$ ,  $V_{oc}$ ,  $P_{max}$ , FF, Types  
Solar panel – Size, orientation, IV characteristics, irradiance data
3. Solar electric system – solar panels, Batteries, Controller, inverter, electrical devices, connecting everything together and installation
4. Lighting – LED lighting – Photometry, principles, IV characteristics, Driving LEDs, Driving LEDs with an AC voltage, Power LEDs, LD lamps, Basic LED circuits, Solar LED street lights
5. Appliances and Energy use
6. Using, maintaining and repairing solar/ Lighting systems

#### **References:**

1. Pico-solar electric systems, John Keane, Routledge, Taylor & Francis group,(2014)
2. Fundamentals of Solid state lighting: LEDs, OLEDs, and their applications in illumination and Display, Vinod Kumar Khanna, CRC press (2014)
3. Solar lighting, Ramchandra Pode, Boucar Diouf, Springer (2011)
4. Solar Electricity handbook, Michael Boxwell, Greenstream publishing (2012)  
[books.google.co.in]
5. Photovoltaic Design and Installation for dummies, Ryan Mayfield, Wiley Publishing Inc. (2010)

## **F.Y. B.Sc. Semester I**

### **Practical Paper – 1 (EEM1103): PCB design & solar lighting lab**

**[Credit-2]**

1. Lay out planning & Artwork preparation (Manual process)
2. Preparation of circuit schematics - Use of open source PCB making software
3. Artwork preparation - Use of open source PCB making software
4. Laboratory PCB making process of Transferring layout on copper clad laminate, PCB Etching and Drilling.
5. Soldering and Desoldering of Components from given PCB
6. Solar panel installation – site planning, Specs, Electrical schematics.
7. Emergency light /Solar lantern assembly and testing: schematics, Electrical connections, assembly & testing
8. LED lighting systems assembly and testing
9. Any other equivalent (with the permission of BOS)

**Experiments -8 + 2- Activity**

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**SEMESTER - II**

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## **F.Y. B.Sc. Semester II**

### **EEM Paper-1(EEM1201): Installation, repair and maintenance of Home appliances [Credits-2: Lectures-36]**

*Home appliances: Mixer, toaster, washing machine, Water heater, Refrigerator, Microwave oven, air conditioner etc.*

1. Tools and materials
2. Appliance diagrams
3. Installation procedures
4. Repair and maintenances tips
5. Troubleshooting steps

#### **Reference:**

1. DIY guide to appliances: Installing and maintaining your major appliances, Steve Willson, Creative Publishing international (2008)
2. Troubleshooting and repairing major appliances, Eric Kleinert, McGraw Hill professional (2012)
3. Consumer Electronics – Bali, Pearson Education (2014)

## **F.Y. B.Sc. Semester II**

### **EEM Paper-2 (EEM1202): Computer hardware assembly / Installations**

**[Credits-2: Lectures-36]**

1. Functional Block Diagram, History, Evolution.
2. An Overview of System and Components. CPU Cabinet: Power supply, SMPS, Motherboard, CPU, Cables and connectors, Main and auxiliary memory, Front and rear panel study. Input devices: wired /wireless Keyboard, Mouse, Joystick, Scanner, Digitizers, Light pen, Touch screen,Barcode Scanner Camcorder. Output devices: Monitor (CRT, LCD/ LED Panel,) Printer: Dot Matrix, Inkjet, LASER, Thermal, Plotter, Barcode Printers,Sound devices (Speaker, Headphone, Bluetooth, dongle)
3. CPU: Microprocessor as CPU, General block diagram of CPU, CPU bus system, Packing, Cooling, Sockets and slots, Comparative study of Microprocessor's features with evolutions, Microprocessor Operations:- Instruction Cycle, Data fetch, Address Decoding, Classification of Interrupts, Input Output Techniques, Device Controllers(DMA controller , Disk drive controller)
4. Computer Memory and Memory Management Techniques: Types and characteristics, Classification, Semiconductor, Magnetic, Optical ROM and its types. RAM and its types: SDRAM, EDORAM, DDR Series, Flash RAM. Memory modules, SIMM and DIMMs. Secondary Memory: Hard Disc Drive, Floppy Disc, CDROM, CD R/W, DVD, Pen Drive, flash memories: Mini/micro SD Card. Formatting and Utility Tools for drivers.

#### **References:**

1. Upgrading and Repairing of PCs, Scott Muller, Que (2014)
2. IBM PC and Clones: Hardware, troubleshooting and maintenance, B. Govindarajalu, Tata Mac Graw Hill (2008)
3. Computer Motherboard Testing and Fault finding, S. K. Gupta
4. A+ guide to PC hardware maintenance and repair, Michael Graves, Thompson (2015)
5. Computer Hardware: Barry Blundell, Thompson (2008)

## **F.Y. B.Sc. Semester II**

### **Practical Paper – 2 (EEM1203): Maintenance of Home Appliances + Computers**

**[Credit-2]**

#### **Practical Paper- 2:**

1. Home appliances – understanding User's/ installation manual [ 2 appliance]
2. Site preparations, electrical connections and installation procedures [ 2 appliances]
3. Identification of system components and their preventive maintenance
4. Site Preparation, Electrical Connections and use of Maintenance kit, Cable Maintenance, Connecting Keyboard, Mouse, Printer, Scanner, Multimedia components and make it working.
5. Identification of system, Explanation of system components: Motherboard 1) Onboard controllers, 2) Add on controllers. (Drives, RAM, CMOS battery, SMPS, BIOS RAM, Chipset, Controllers, cables, connectors and tools.
6. PC Assembly / disassembly
7. installation of OS and software
8. DOS based practical Internal External commands, Directory handling and Practical on AUTOEXEC. BAT and CONFIG.SYS files (Only Demo), Desk top and control panel settings of windows operating system.

#### **8- Experiments, 2- Activity.**