

Deccan Education Society's  
Fergusson College (Autonomous), Pune

Syllabus under Autonomy for

**S.Y. B.Sc. Vocational Electronic Equipment Maintenance (EEM)**

From academic year 2017-18

<b>Particulars</b>	<b>Name of Paper</b>	<b>Paper code</b>	<b>Title of Paper</b>	<b>Type of Paper</b>	<b>No. of Credits</b>
S.Y. B.Sc. EEM Semester III	Theory Paper - 1	EEM2301	Maintenance concepts	CORE-1	3
	Theory Paper - 2	EEM2302	Principles of Audio & video systems	CORE- 2	3
	Practical Paper - 1	EEM2303	EEM Practical -III	PCORE-1	2
S.Y. B.Sc. EEM Semester IV	Theory Paper - 3	EEM2401	Troubleshooting of Electronic equipment	CORE-3	3
	Theory Paper - 4	EEM2402	Consumer Electronics	CORE-4	3
	Practical Paper - 2	EEM2403	EEM Practical -IV	PCORE-2	2

**S.Y. B.Sc. Semester III**  
**EEM paper -1(EEM2301): Maintenance concepts**

**[Credits-3]**

**Objectives:**

1. To understand Maintenance Concepts, terminology and definitions
2. To understand the concept of troubleshooting.
3. To study basic preparatory topics of components and their testing
4. To understand the troubleshooting procedures

<b>Unit 1</b>	<b>Reliability aspect :</b> Electronic Equipment, Potential Problems, Quality, Terminology and definitions of: Reliability, Failure, Failure Rate, Mean Time between Failures(MTBF), Mean Time to Fail(MTTF), Mean Time To Repair(MTTR), Maintainability, Availability, Redundancy; Accelerated assessment of reliability, practical reliability consideration.	<b>4</b>
<b>Unit-2</b>	<b>Fundamental Trouble Shooting Procedures :</b> Making of Electronic equipment, Reading drawings and diagram, Equipment failures, Causes of equipment failures, Nature of faults, Maintenance terminology, troubleshooting process, fault-finds aids, troubleshooting techniques, corrective actions, general guidelines	<b>10</b>
<b>Unit-3</b>	<b>Tools and aids for servicing and maintenance :</b> Hand tools- pliers, cutters, spanners, screw drivers, nut drivers, hacksaw, drills, files, other workshop tools; soft tools – solvents, adhesives, lubricants, freeze sprays	<b>10</b>
<b>Unit 4</b>	<b>Passive components and their testing :</b> Resistor, capacitor, inductors, AF transformers, IF transformers, switches, connectors, relays, solenoids, visual identification and color codes, device marking schemes and interpretation of information printed on the body of devices Failures and testing in resistors, potentiometers, LDRs, thermistors, capacitors, variable capacitors, inductors. Motors (DC), contactor, circuit breakers, Fuses, MCB, ELCB Connectors and jacks in PC, Cellphone, still camera, video Camera, Car audio/video system, Home audio/video system Electrochemical cells – Chargeable, non rechargeable, AA, AAA, Button, Cell phone battery, Typical voltages, Amp-Hour rating, precautions during use and disposal	<b>14</b>
<b>Unit- 5</b>	<b>Electrical wiring and Equipment enclosures/cabinets :</b> Types of Wires, Gauges, Selection of wires, Types of cables, UTP, STP, Armoured, flat ribbon type etc with examples of common applications safe voltage and current ranges, Colour conventions, Wire harnessing. Typical Simple Household Wiring, Wiring of tube light, switchboard wiring, stair case wiring, fan regulator and fan wiring, Power cable wiring, grounding and shielding, Earthing – necessity and methods. Electric shock and precautions. Enclosure Types: Cabinet racks (incl.	<b>10</b>

	NEMA 12) ,Server racks, Co-location racks, Open racks (Large open racks, table-top racks, swing-frame, relay racks), Wall mount cabinets Rack mount enclosures, Card racks, Portable cabinets, Chassis, Small metal enclosures, Cast metal enclosures, Plastic boxes, NEMA 4x enclosures	
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**Books:**

1. Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by Khandpur, TMH (2010)
2. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001
3. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F.M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi (2003)

**S.Y. B.Sc. Semester III**  
**EEM Paper-2 (EEM2302): Principles of Audio and Video Systems**

**[Credits-3]**

<b>Unit-1</b>	<b>Microphone:</b> Characteristics, requisites, Types of microphones – moving coil, ribbon, crystal, capacitor, electrets, carbon, special microphones, comparison.	<b>6</b>
<b>Unit-2</b>	<b>Loudspeakers :</b> Characteristics, Types of microphones – Moving coil cone, electro-dynamic, horn type, comparison, baffles and enclosures, multi-way speaker system-woofers, tweeters, cross over network.	<b>6</b>
<b>Unit-3</b>	<b>Audio and video recording principles :</b> Disc recording and reproduction, magnetic recording and reproduction, optical recording and reproduction.ACD, DVD, BRD.	<b>14</b>
<b>Unit-4</b>	<b>Public address system :</b> Need and use, block diagram, requirements of PA system, Installation and planning for auditorium, public park, college sports even, stadium	<b>8</b>
<b>Unit-5</b>	<b>Television :</b> Generation of video signal, monochrome and colour cameras, <i>construction and working of CCD</i> and CMOS sensors ,digital video camera and its specifications. Monochrome, colour TV systems brief concept.	<b>14</b>
<b>Books:</b>  1) Audio and video systems: Principles, maintenance and troubleshooting, R. G. Gupta, Tata Mc Graw Hill (2010)		

**S.Y. B.Sc. Semester I**  
**Practical Paper – 1 (EEM2303): EEM Practical -III**

[Credit-2]

**Any Two from each group & Total – 10 experiments**

<b>Group-A</b>	Terminal identification and functional checking using multimeter (use of Operating instructions manual / component datasheet is mandatory) 1. Rheostat, Potentiometer And Switches, EM Relay, Transformer, AutoTransformer (Dimmerstat),Fuses 2. Diode, Zener, Transistor (At least 3 different packages each) and LEDs(different wattages and colours), LED strips, Neon indicator lamp 3. DC Sources: Battery (5 Different types), Solar PV cell, Battery Eliminator, CVCC Power Supply	
<b>Group-B</b>	Electrical Wiring (including drawing schematic), Home appliances (Schematic, Identification of parts, disassembly and assembly) 1. Tube light testing 2. Switch board wiring 3. Electric iron (semi automatic or fully automatic)	
<b>Group-C</b>	Audio (Schematic, Identification of parts, Troubleshooting tips) 1. PA system 2. Characteristics of microphones/loudspeaker 3. CD player	
<b>Group-D</b>	Video (Schematic, Identification of parts, Troubleshooting tips) 1. TV system 2. VCD/DVD player 3. Home theatre + <b>Activity:</b> Equivalent to 2 experiments	

**S.Y. B.Sc. Semester IV**  
**EEM Paper-1 (EEM2401): Troubleshooting Electronic equipment**  
**[Credits-3]**

<b>Unit 1</b>	<b>Testing of Semiconductor Devices :</b> Types of semiconductor devices, Causes of failure in Semiconductor Devices, Types of failure Test procedures for Diodes, special types of Diodes, Bipolar Junction Transistors, Field Effect Transistors, Thyristors , Operational Amplifiers, Fault diagnosis in op-amp circuits	<b>8</b>
<b>Unit 2</b>	<b>Troubleshooting Digital Circuits :</b> Logic IC families, Packages in Digital ICs, IC identification, IC pin-outs, Handling ICs, Digital troubleshooting methods – typical faults, testing digital ICs with pulse generators Logic clip, Logic Probe, Logic Pulser, Logic Current Tracer, Logic Comparator Special consideration for fault diagnosis in digital circuits Handling precautions for ICs sensitive to static electricity Testing flip-flops, counters, registers, multiplexers and demultiplexers, encoders and decoders; Tri-state logic	<b>12</b>
<b>Unit 3</b>	<b>Rework and Repair of Surface Mount Assemblies :</b> Surface Mount Technology and surface mount devices Surface Mount Semiconductor packages – SOIC, SOT, LCCC, LGA, BGA, COB, Flatpacks and Quad Packs, Cylindrical Diode Packages, Packaging of Passive Components as SMDs Repairing Surface Mount PCBs, Rework Stations	<b>10</b>
<b>Unit 4</b>	<b>Troubleshooting - Case studies :</b> Power supply circuits- Types of Regulators, Power Supply Troubleshooting, SMPS, High Voltage DC Power supplies; Oscilloscope – Fault Diagnosis chart, CRT replacement	<b>12</b>
<b>Unit-5</b>	<b>Preventive maintenance :</b> Indications for preventive maintenance actions, preventive maintenance of Electronic circuits, mechanical systems, General guideline for cleaning and lubricating, Typical example of PC maintenance	<b>6</b>

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3. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F.M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi (2003)

**S.Y. B.Sc. Semester IV**  
**EEM Paper-2 (EEM2402): Consumer Electronics**

**[Credits-3]**

<b>Unit-1</b>	<b>Audio Systems :</b> AM and FM radio receiver, world band receiver, receiver characteristics and alignment; Principles of recording and replay of audio CD/VCD/DVD/ Blu-Ray disc; Audio compression and its use, MP3/MP4 player, Different audio/Video file formats and their comparison, Typical Automotive infotainment system - block diagram	<b>12</b>
<b>Unit-2</b>	<b>Video Systems :</b> Purpose of changing over from analog to digital TV and its timeline, Digital TV standards, SDTV / HDTV, Set-top box for cable TV and for DTH; Construction and working of LCD, plasma, LED TV and flat panel displays . Block diagram of digital LCD and plasma TV. Video monitors- CRT and LCD/LED; Block diagram of VCD player and DVD/BD player; Applications of TV: CCTV and CATV, Other application areas for TV such as education, underwater and in nuclear installations, Smart or web enabled TV.	<b>16</b>
<b>Unit-3</b>	<b>Projectors :</b> Construction, working principle and applications of : multimedia , Multimedia /Data projector, LCD and DLP projectors, large screen and rolling display, slide projector and overhead projector, Dolby and ATMOS standards.	<b>8</b>
<b>Unit-4</b>	<b>Mobile/ smart gadgets :</b> Construction, working principle and applications of CDMA/GSM phone, cordless phone, POS terminal, GPS navigator, photocopier, multifunction printer and EPABX	<b>12</b>
<b>Books:</b> 1. Consumer Electronics by S P Bali, Pearson 2008		

**S.Y. B.Sc. Semester IV**  
**Practical Paper – 2 (EEM2403): EEM Practical -IV**

**[Credit-2]**

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**Practical Paper- 2**

<b>Any 8- Experiments</b>	<ol style="list-style-type: none"><li>1. Fault diagnosis in Diode/Transistor circuits</li><li>2. Fault diagnosis in opamp circuits</li><li>3. Troubleshooting in combinational circuits</li><li>4. Troubleshooting in Sequential circuits</li><li>5. Troubleshooting the power supply</li><li>6. Preventive maintenance of PC</li><li>7. Preventive maintenance of audio/video system</li><li>8. Preventive maintenance of Projectors / printers</li><li>9. Fault diagnosis of radio receiver</li></ol>
<b>Activity</b>	<b>equivalent to 2 experiments</b>