DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW

STUDY, EVALUATION SCHEME & SYLLABUS

For

B. Voc.
Electronics Manufacturing Services

Based on

AICTE Model Curriculum

(EFFECTIVE FROM THE SESSION: 2019-20)
### EVALUATION SCHEME

**Electronics Manufacturing Services**

#### NSFQ Level 5 SEMESTER-I

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.GV.01</td>
<td>Electronic Measurement and Instrumentation –I</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>2</td>
<td>5.GV.02</td>
<td>Identification of Components, Tools, SOP &amp; Work Instructions –I</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>3</td>
<td>5.GV.03</td>
<td>Tools, Equipment &amp; Safety Measures –I</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>4</td>
<td>5.GV.04</td>
<td>Soldering &amp; De-Soldering of Components –I</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>5</td>
<td>5.VP.01</td>
<td>Identification of Components, Tools, Equipment and its working –Lab</td>
<td>30</td>
<td>20</td>
<td>30 50 1</td>
</tr>
<tr>
<td>6</td>
<td>5.VP.02</td>
<td>Electronic Measurement and Instrumentation –Lab</td>
<td>30</td>
<td>20</td>
<td>30 50 1</td>
</tr>
<tr>
<td>7</td>
<td>5.GP.03</td>
<td>Language Lab</td>
<td>30</td>
<td>20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>OJT 5.01 Embedded Software Engineer (ELE/Q1501)</td>
<td>Any one Training 400 hrs/ 8 weeks</td>
<td>150 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OJT 5.02 Security System Service Engineer (ELE/Q4610)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OJT 5.03 Systems Analyst (ELE/Q8701)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OJT 5.01 Embedded Software Engineer (ELE/Q1501)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>610</td>
<td></td>
<td>500 24</td>
</tr>
</tbody>
</table>

#### NSFQ Level 5 SEMESTER- II

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.GV.05</td>
<td>Electronic Measurement and Instrumentation –II</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>2</td>
<td>5.GV.06</td>
<td>Identification of Components, Tools, SOP &amp; Work Instructions –II</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>3</td>
<td>5.GV.07</td>
<td>Tools, Equipment &amp; Safety Measures –II</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>4</td>
<td>5.GV.08</td>
<td>Soldering &amp; De-Soldering of Components &amp; Emergency actions II</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>5</td>
<td>5.VP.04</td>
<td>Soldering &amp; De-Soldering of Components- Lab</td>
<td>30</td>
<td>20</td>
<td>30 50 1</td>
</tr>
<tr>
<td>6</td>
<td>5.VP.05</td>
<td>Electronic Measurement and Instrumentation -II (Lab)</td>
<td>30</td>
<td>20</td>
<td>30 50 1</td>
</tr>
<tr>
<td>7</td>
<td>5.GP.06</td>
<td>IT Tool Lab</td>
<td>30</td>
<td>20</td>
<td>30 50 2</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>OJT 5.05 Smartphone Assembly Inspector (ELE/Q4001)</td>
<td>Any one Training 400 hrs/ 8 weeks</td>
<td>150 12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OJT 5.06 Business Development Executive (ELE/Q1101)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td>610</td>
<td></td>
<td>500 24</td>
</tr>
<tr>
<td>S. No.</td>
<td>Subject Code</td>
<td>Subject</td>
<td>Total Teaching/ Training Hours</td>
<td>Evaluation Scheme</td>
<td>End Semester</td>
</tr>
<tr>
<td>-------</td>
<td>--------------</td>
<td>----------------------------------------------</td>
<td>--------------------------------</td>
<td>-------------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT</td>
<td>TA</td>
<td>AT</td>
</tr>
<tr>
<td>1</td>
<td>6.GV.01</td>
<td>Fault analysis &amp; Repairs</td>
<td>30</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6.GV.02</td>
<td>Good Manufacturing Concept &amp; Practices – I</td>
<td>30</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6.GV.03</td>
<td>Electronics Devices Circuit – I</td>
<td>30</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>6.GV.04</td>
<td>Electronics System Packaging and Manufacturing</td>
<td>30</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6.AV.01</td>
<td>Univ. Human Val. &amp; Ethics / Environ &amp; Eco</td>
<td>30</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6.VP.01</td>
<td>Electronics Devices Circuit – I Lab</td>
<td>30</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6.VP.02</td>
<td>Fault analysis &amp; Repairs – Lab +</td>
<td>30</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OJT 6.01</td>
<td>Field Engineer RACW (ELE/Q3105)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OJT 6.02</td>
<td>Security System Service Engineer (ELE/Q4610)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OJT 6.03</td>
<td>Pre-Sales Solar Technical Support Engineer (ELE/Q5602)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>610</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/ Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT</td>
<td>TA</td>
<td>AT</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>6.GV.05</td>
<td>Good Manufacturing Concepts Practices – II</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6.GV.06</td>
<td>Manufacturing &amp; Quality Norms</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6.GV.07</td>
<td>Good Manufacturing Concepts Practices – III</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>6.GV.08</td>
<td>Electronics Devices Circuit – II</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6.AV.02</td>
<td>Environ &amp; Eco / Univ. Human Val. &amp; Ethics</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6.VP.03</td>
<td>Electronics Devices Circuit – II Lab</td>
<td>30</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6.VP.04</td>
<td>Manufacturing Practices</td>
<td>30</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>OJT 6.05</td>
<td>Purchase Executive (ELE/Q5701)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OJT 6.06</td>
<td>Quality Engineer (ELE/Q7901)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>610</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### NSFQ Level 7 SEMESTER - V

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.GV.01</td>
<td>Valuation &amp; Storage</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>7.GV.02</td>
<td>Shelf Life, Ware House Operations Management &amp; Material Transactions</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>7.GV.03</td>
<td>Industrial Electronics Product Design</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>7.GV.04</td>
<td>Pre-Production Activities</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>7.AV.01</td>
<td>Indian Constitution / Essence of Indian Traditional Knowledge</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>7.VP.01</td>
<td>Pre-Production Activities-Lab</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>7.VP.02</td>
<td>Valuation &amp; Storage-Lab</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>OJT 7.01</td>
<td>Product Engineer (ELE/Q4201)</td>
<td>Any one Training 400 hrs/8 weeks</td>
<td></td>
<td>150</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>OJT 7.02</td>
<td>Incoming QC Technician (ELE/Q4401)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OJT 7.03</td>
<td>Assembly Supervisor (ELE/Q6305)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>610</strong></td>
<td></td>
</tr>
</tbody>
</table>

### NSFQ Level 7 SEMESTER - VI

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Total Teaching/Training Hours</th>
<th>Evaluation Scheme</th>
<th>End Semester</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.GV.05</td>
<td>Entrepreneurship/Accounting/Management</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>7.GV.06</td>
<td>Trouble shooting and Maintenance of Electronics Equipment</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>7.AV.02</td>
<td>Essence of Indian Traditional Knowledge / Indian Constitution</td>
<td>30</td>
<td>10 5 5 20</td>
<td>30</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>7.VP.03</td>
<td>Major Project</td>
<td>180</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>OJT 7.05</td>
<td>FPGA Design Engineer (ELE/Q8201)</td>
<td>Any one Training 400 hrs/8 weeks</td>
<td></td>
<td>200</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>OJT 7.06</td>
<td>Sales Executive-Consumer Electronics (ELE/Q3201)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>670</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Total Credit: 24**
Detailed Curriculum
Level 5 (Semester I)

(5.GV.01) Electronic Measurements and Instrumentation-I

**Unit, dimensions and standards**
Scientific notations and metric prefixes, SI electrical units, SI temperature scales, Other unit systems, dimension and standards. Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis. PMMC instrument, galvanometer, DC ammeter, DC voltmeter, series ohm meter Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, probes Digital voltmeter systems, digital multi-meters, digital frequency meter system.

**Electromagnetic Effects**
Permanent magnets and Electromagnets, their construction and uses, Polarities of an electromagnet and rules for finding them, Faraday’s Laws of Electromagnetic Induction, Dynamically induced e.m.f., its magnitude and induction, inductance and its unit. Mutually induced e.m.f., its magnitude and direction, Energy stored in an inductance. Force acting on a current carrying conductor in magnetic field, its magnitude and direction, Principles and construction of dynamo.

**A.C Circuits**
Generation of A.C. voltage, its generation and wave shape. Cycle, frequency, peak value R.M.S. value, form factor, crest factor, Phase difference, power and power factor, A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and capacitance, Q factor of R.L.C. series circuits.

(5.GV.02) Identification of Components, Tools, SOP & Work Instructions-I

1. Main components & modules/ sub-assemblies of electronic equipment
   - Control Panel (System Controller)
   - Keypads
   - Door and Window Contacts
   - Motion Detectors
   - Glass Break Detection
   - Smoke Detectors
   - Heat Sensors
   - Carbon Monoxide Detectors
   - Water Detectors (or Water Bug)
   - Temperature Sensors
   - Capacitance switches / control push buttons & rotary switches

2. Introduction to Basic Electricity

**Current Electricity**
Definition of Resistance, Voltage, Current, Power, Energy and their units, Relation between electrical, mechanical and thermal units, Temperature variation of resistance, Difference between AC and DC voltage and current.
D.C. Circuits

Electric Cells
Primary cell, wet cell, dry cell, battery, Li-ion battery, series and parallel connections of cells, Secondary cells, Lead Acid Cell, Discharging and recharging of cells, preparation of electrolyte, care and maintenance of secondary cells.

Lighting Effects of Current
Lighting effect of electric current, filaments used in lamps, and Tubelight, LED, their working and applications.

Capacitors
Capacitor and its capacity, Concept of charging and Discharging of capacitors, Types of Capacitors and their use in circuits, Series and parallel connection of capacitors, Energy stored in a capacitor.

3. Introduction and Identification of Electronics Components
- Electronic controls in a common way
- Diode, Transistors, Op-Amp
- Number systems and Boolean Algebra
- Logic Gates
- Flip-Flops
- Counters
- Multiplexers
- Decoders
- LED, LCD and 7 segment display
- RAM and ROM

4. Concept of Amplification factor, Gain & Signal distortion

(5.GV.03) Tools, Equipment and Safety Measures-I

1. Cables & Connectors
- Non-Metallic Sheathed Cable
- Un grounded & Grounded Power Supply Cable
- Metallic Sheathed Cable
- Multi-Conductor Cable
- Coaxial Cable
- Unshielded Twisted Pair Cable
- Shielded twisted pair cable
- Ribbon Cable
- Armoured & Unarmoured Cable
- Twin-Lead Cable
- Twin axial Cable
- Optical fiber cable
- Connectors

1. ESD Clothing
- What to wear, how to wear
(5.GV.04) Soldering & De-Soldering of Components-I

1. Soldering & De Soldering of Basic Components
   - Soldering Tools
   - Different types of Soldering Guns related to Temperature and wattages, types of tips
   - Solder materials and their grading
   - Soldering and De Soldering Stations and their Specifications
   - Preparing Component for Soldering
   - PCB Applications
   - Types of PCB
   - Soldering Basic Components on PCB
   - De soldering Basic Components
   - Safety precautions while Soldering & De soldering
   - Check for cold continuity of PCB
   - Identification of loose/dry solder, broken tracks on printed wire assemblies & discrete components mounted circuit boards
   - Join the broken PCB track and test
   - De soldering using Pump and wick
   - Introduction of SMD Components

(5.VP.01) Identification of Components, Tools, SOP & Work Instructions-I (Lab)

1. Identification & working of various electronic components
2. Working of testing equipment
3. Measurement using Multimeter & Clamp meter
4. Battery health check-up
5. Measure and test the voltage of given cells.
6. Verification of truth tables for AND, OR, NOT and NAND logic gates.
7. Verification of truth tables for NOR, XOR and XNOR logic gates.
8. Construction and verification of operations of half adder and full adder circuits using basic gates.
9. Study and verification of truth tables for 3 line to 8 line decoder.
10. Study and verification of truth tables for 4:1 MUX using gates
11. Study and verification of truth tables for 1:4 DEMUX using gates.
13. Study and verification of truth table for universal shift register.
14. Study the operation of a synchronous counter.

(5.VP.02) Electronic Measurement and Instrumentation-I (Lab)

1. Study of semiconductor diode voltmeter and its use as DC average responding AC voltmeter.
2. Study of L.C.R. bridge and determination of the value of the given components.
3. Study of distortion factor meter and determination of the % distortion of the given oscillator.
4. Study of the transistor tester and determination of the parameters of the given transistors.
**Level 5 (Semester II)**

*(5.GV.05) Electronic Measurements and Instrumentation - II*


*(5.GV.06) Identification of Components, Tools, SOP & Work Instructions-II*

1. Introduction to wireless communication
2. Signal Converters
3. Tools & their Uses
   - Use of tester to monitor AC Power
   - Skin the electrical wires/cables using the wire stripper and cutter
   - Main cable for control & electronic circuit wires
   - Crimping tools and buses
4. Introduction to measuring equipment’s
   - Signal generator’s
   - CRO
   - Function Generators
   - Frequency Counter
   - Logic analyzer
   - Spectrum analyzer
   - LCRQ Meter
5. Standard Operating Procedures and Work Instructions
   - What is SOP and WI
   - How to read & follow SOP and WI
   - Overall Quality Assurance Plan

*(5.GV.07) Tools, Equipment & Safety Measures-II*

1. Tools & Equipment
   - Types of tools & equipment required and deployed in manufacturing, installing & servicing
   - Identification and termination process
   - General maintenance of tools/equipment and recalibration of Test equipment
   - General safety and common-sense safety
2. PPE
   - Usage & benefits of PPE
• Types & usage of various PPE
• Maintenance of PPE

2. Clean Room Environment
• Do’s and Don’t
• Shop Floor Discipline

(5.GV.08) Soldering & De-soldering components & Emergency actions

1. Introduction to SMD Components
• Identification of 2, 3, 4 terminal SMD components
• Soldering the SMD components on the PCB
• Make the necessary settings on SMD soldering station to solder various ICs of different packages by choosing proper clamping tools
• Identify various connections and the setup required for SMD soldering station
• De solder the SMD components from the given PCB
• Make the necessary settings on SMD soldering station to de solder various ICs of different packages by choosing proper clamping tools
• Make a panel board using different types of switches for a given application
• Identification of crimping tools for various IC packages
• Reliable Soldering Practices

2. Emergency actions
• Minimum Requirements
• Reporting Emergencies
• Emergency exits
• Primary and secondary evacuation routes
• Locations of fire extinguishers
• Fire alarm pull stations’ location
• Assembly points
• Medical Services

(5.VP.03) Soldering & De-soldering of components - II Lab

1. Assemble the product
2. Dis-assemble the product
3. Safety Precautions & emergency plans

(5.VP.04) Electronic Measurement-II Lab

1. Study of the following transducer (i) PT-100 trans (ii) J-type trans. (iii) K-type trans (iv) Pressure transducer
2. Measurement of phase difference and frequency using CRO (lissajous figure)
3. Measurement of low resistance Kelvin’s double bridge.
4. Radio Receiver Measurements
Level 6 (Semester III)
(6.GV.01) Fault Analysis & Repairs

1. Classification of fault
2. Identification of fault
3. Rectification of fault
4. Repairing/Replacing Module
5. Analysis for the different types of equipment’s
   - Smartphones
   - Air Conditioning
   - Security systems
   - Electronically controlled doors
6. Fault analysis based on hardware and software component
7. Diagnostic and Testing Methods
8. Visual Inspection
9. Earth Continuity Test
10. Insulation Resistance Test

(6.GV.02) Good Manufacturing Concept & Practices – I

- TQM (Total Quality Management) & Kaizen
- Inventory Management & Logistics in brief
- Quality assurance
- Checklist
- SWOT analysis
- Lean Manufacturing
- Muda, Mura & Muri – Toyota Production System (TPS)
- Spatial considerations & other related concepts

(6.GV.03) Electronics Devices & Circuit-I

Unit I


(6.GV.04) Electronics System Packaging and Manufacturing

Evolution and Classification of Printed Circuit Boards, Challenges in Modern PCB Design and Manufacture, PCB fabrication methodologies (SSB, DSB and multilayer board), PCB design considerations/ design rules for analog, digital and power applications, Electromagnetic
interference in electronic systems and its impact. Analysis of electronic circuit from noise emission point of view (both conducted and radiated emission) cross talk and reflection behavior of the circuit in time domain, Thermal management of electronic devices and systems.

Semiconductor Packages: Single chip packages or modules. (SCM) Commonly used packages and advanced packages; Materials in packages, Current trends in Packaging, Multichip modules (MCM)-types; System-in package (SIP); Packaging roadmaps; Hybrid circuits. Pipe and FIFOs, Shared memory, Sockets

(6.VP.01) Electronic Devices and Circuits Lab

1. Study of Lab Equipments and Components: CRO, Multimeter, and Function Generator, Power supply- Active, Passive Components and Bread Board.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance.
6. Study CE configuration for NPN and PNP transistors and measurement of voltage and current gain.
7. Study CB configuration for NPN and PNP transistors and measurement of voltage and current gain.
8. Study CC configuration for NPN and PNP transistors and measurement of voltage and current gain.

(6.VP.02) Fault Analysis & Repairs - Lab

1. Categorization of faults
   - Hardware/Software, User Induced, Component Failures
   - L0 to L4 repairs
2. Testing electrical/electronic components in the product
3. Troubleshoot and repair of the faults identified in the product
   - Microphone
   - Musical Instruments (Loudspeakers)
   - Recorder (CD/ DVD Player)
4. Preventive Maintenance Services
5. Basic Occupational Safety and Precautions
6. Microphones and Loudspeakers
Level 6 (Semester IV)

(6.GV.05) Good Manufacturing Concepts & Practices – II

- Work Study Concepts
  - Method study
  - Work measurement
  - Sequencing of Operations and timing the flow steps
  - Advantages of work study

- Team Working
  - Forming
  - Storming
  - Norming
  - Performing
  - Adjourning

(6.GV.06) Manufacturing & Quality Norms

1. Manufacturing & Quality Norms - keep it differently according to all applications
   - Manpower Deployment and Operations as per Work Instructions and criticality of the process Understanding how to form each operation and practical training of operation
   - Understanding accept and reject criterion of a particular operation. Practical training of testing/checking each operation
   - Quality Norms of accept and practical training of electronic equipment’s/Devices
   - Acceptance/ Rejection training of various defects

2. Manufacturing & Quality Norms – II
   - Process in packing line-Packing line Operations sequence flow and its importance
   - Quality Systems - Accept, Reject criterion of various tests at OQA
   - Training of Assembly of electronic components - Assemble, Check, test electronic components
   - Various Labels and their Importance - Understanding Labels, Scanning and its importance
   - Packing of components/devices - Various Stages of packing
   - Acceptance, Reject and sampling following QA norms - AQL level, Sampling techniques, as per QA sampling accept, reject numbers


1. Good Manufacturing Concepts & Practices - II
   - Brief Introduction
   - Total Quality Management
     - ISO Standards
   - Kaizen
   - Toyota Production System
o Lean Manufacturing
  • Combination of Inventory
  • Supply Chain
o Quality and Inspection
  • 3 Sigma and 6 Sigma Orientation

(6.GV.08) Electronic Devices and Circuits –II

UNIT I MOSFET: Device structure and its operation in equilibrium, V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, small-signal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier

UNIT II BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, frequency response of CE amplifier.

UNIT III Feedback: The general feedback structure, properties of negative feedback, the four basic feedback topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier. Oscillators: Basic principles of sinusoidal oscillators, op-amp RC oscillator circuits, LC oscillator

(6.VP.03) Electronic Devices and Circuits –II Lab

1. Characteristic of BJT: BJT in CE configuration- Graphical measurement of hparameters from input and output characteristics. Measurement of Av, Al, Ro and Ri of CE amplifier with potential divider biasing.
5. Oscillators: Sinusoidal Oscillators a. Wein’s bridge oscillator b. phase shift oscillator.

(6.VP.04) Manufacturing Practices

1. Work study concepts
2. Team work concepts
Level 7 (Semester V)

(7.GV.01) Valuations & Storage

1. Valuation
   - Specific Item cost
   - Weighted average cost

2. Storage
   - Stacking Norms
   - Bin Cards
   - Stores Layout
   - Categorization of Materials
     - Hazardous/Non-Hazardous
     - Imported/Local
     - Assembly/ Parts
     - Consumables
     - Class A/B/C
     - Good/defective

(7.GV.02) Shelf Life, Ware House Operations Management & Material Transactions

1. Shelf Life Management
   - FIFO
   - FILO
   - LIFO
   - LILO

2. Material Transactions
   - Inward
   - Outward
   - Suspense
   - RMA (Return Material Authorization)
   - Insurance

(7.GV.03) Industrial Electronic Product Design


(7.GV.04) Pre-Production Activities

Pre-Production activities
   - Layout
   - Time Study & Motion Study
   - Two Hand Insertion
   - Non-value adding activities
• Positioning of Bins
• Line Balancing

(7.VP.01) Pre-Production Activities Lab

• Pre-Production activities
  o Two Hand Insertion
  o Positioning of Bins

• House Keeping
• 5S

(7.VP.02) Valuations & Storage Lab

• Categorization of Raw Material & Consumables
  o Hazardous/Non-Hazardous
  o Imported/Local
  o Assembly/Parts
  o Class A/B/C
  o Good/defective

• Material Transactions
  o Inward
  o Outward
  o Suspense

Level 7 (Semester II)

(7.GV.05) Accounting & Management/Entrepreneurship

1. Introduction
Meaning and Nature of Management, Management Approaches, Processes, Managerial Skills, Tasks and Responsibilities of a Professional Manager.

2. Organizational Structure and Process
Organizational Culture and Climate, Managerial Ethos, Organization Structure & Design, and Managerial Communication.

3. Planning and Controlling

4. Performance Evaluation Techniques:
Introduction to Budgeting and Budgetary Control; Performance Budgeting; Classification of Budget; Standard Costing and Variance Analysis; Balanced Scorecard; Responsibility Accounting.

5. Decision Making Techniques:
Cost Volume Profit Analysis; Management Accounting for Decision Making and Control; EVA and Performance Measurement; Introduction to Activity Base Costing, Targeting Costing, Life Cycle Costing; Uniform Costing.
Course Contents:

1. Entrepreneurship: Concept and Definitions; Entrepreneurship and Economic Development; Classification and Types of Entrepreneurs; Entrepreneurial Competencies; Factor Affecting Entrepreneurial Growth – Economic, Non-Economic Factors; EDP Programmes; Entrepreneurial Training; Traits/Qualities of an Entrepreneurs; Entrepreneur; Manager Vs. Entrepreneur.

2. Opportunity / Identification and Product Selection: Entrepreneurial Opportunity Search and Identification; Criteria to Select a Product; Conducting Feasibility Studies; Project Finalization; Sources of Information.

3. Small Enterprises and Enterprise Launching Formalities : Definition of Small Scale; Rationale; Objective; Scope; Role of SSI in Economic Development of India; SSI; Registration; NOC from Pollution Board; Machinery and Equipment Selection; Project Report Preparation; Specimen of Project Report; Project Planning and Scheduling using Networking Techniques of PERT / CPM; Methods of Project Appraisal.

4. Role of Support Institutions and Management of Small Business : Director of Industries; DIC; SIDO; SIDBI; Small Industries Development Corporation (SIDC); SISI; NSIC; NISBUD; State Financial Corporation SIC; Marketing Management; Production Management; Finance Management; Human Resource Management; Export Marketing; Case Studies-At least 4 (four) in whole course

(7.GV.06) Trouble Shooting & Maintenance of Electronics Equipment's-II

1. TV System
   - 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, colour transmission.
   - Cable type TV system, Head end processor, Trunk & cable distribution system with block diagram, Scrambling.
   - Introduction to LCD and LED TV systems, Introduction to high definition systems. Steps for Fault finding & Analysis.

2. Modern Appliances

(7.VP.03) Project Work