

First – Year Curriculum Syllabus for  
B.Voc. Degree Programme in  
**Electronics Manufacturing  
Services**

(Dr Babasaheb Ambedkar Technological University, Lonere)

## Semester I

Sr. No.	Course Code	Name of the Course	Teaching scheme			Evaluation Scheme			Credits	Total Marks
			L	T	P	IA	MSE	ESE		
<b>General Education</b>										
			<b>Theory</b>							
1	BVEMC101	Elements of Electrical and Electronics Engineering	3	0	0	25	0	25	3	50
2	BVEMC102	Identification of Components, Connectors, Cables and Applications	3	0	0	25	0	25	3	50
3	BVEMC103	Basic Instrumentation	3	0	0	25	0	25	3	50
4	BVEMC104	IT foundation and Programming Concepts	3	0	0	25	0	25	3	50
<b>Total</b>									<b>12</b>	<b>200</b>
<b>Skill Components</b>										
			<b>Lab/Practical</b>							
5	BVSWL105	Elements of Electrical and Electronics Engineering Lab	0	0	1	25	0	25	1.5	50
6	BVEML106	Identification of Components, Connectors, Cables and Applications Lab	0	0	1	25	0	25	1.5	50
<b>On-Job-Training (OJT)</b>										
7	BVEME117	Electrical Technician (ELE/Q6301)	200 (150 Marks External Assessment by NSDC / SSC and 50 Marks Internal Assessment)					15	200	
<b>Total</b>									<b>18</b>	<b>300</b>

## Semester II

Sr. No.	Course Code	Name of the Course	Teaching scheme			Evaluation Scheme			Credits	Total Marks
			L	T	P	IA	MSE	ESE		
<b>General Education</b>										
			<b>Theory</b>							
1	BVEMC201	Sensors and Transducers	3	0	0	25	0	25	3	50
2	BVEMC202	Analog and Digital Electronics	3	0	0	25	0	25	3	50
3	BVEMC203	Electrical Drives and Control	3	0	0	25	0	25	3	50
4	BVEMC204	Soldering, De-Soldering of Components & Emergency actions	3	0	0	25	0	25	3	50
<b>Total</b>									<b>12</b>	<b>200</b>
<b>Skill Components</b>										
			<b>Lab/Practical</b>							
5	BVEML205	Analog and Digital Electronics Lab	0	0	1	25	0	25	1.5	50
	BVEML206	Electrical Drives and Control Lab	0	0	1	25	0	25	1.5	50
<b>On-Job-Training (OJT)</b>										
7	BVEME217	Smartphone Repair Technician (ELE/Q8104)	200 (150 Marks External Assessment by NSDC / SSC and 50 Marks Internal Assessment)						15	200
8	BVEME228	Business Development Executive (ELE/Q1101)								
<b>Total</b>									<b>18</b>	<b>300</b>

**Semester**

**I**

**Syllabus**

<b>Subject Name: Elements of Electrical and Electronics Engineering</b>		
<b>Course Code :BVEMC101</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --25 Practical 25 Term</b>	
<b>Credit :03</b>		
<b>Content</b>		<b>Hours</b>
<b>Unit – I</b>	<b>1.0 D.C. Circuits</b>	06
	Ideal and Practical Energy Sources, Line Regulation and Load Regulation, Source Transformation, Star-Delta Transformation, Application of Kirchoff's Law, Capacitor: Types of Capacitor, Capacitance of Multiple Parallel Plate Capacitor, Energy stored in a Capacitor, Charging & Discharging of Capacitor & Time constant.	
<b>Unit – II</b>	<b>2.0 Magnetic circuit &amp; Electromagnetic Induction</b>	06
	Law of Magnetic Circuit, Series & parallel Magnetic Circuits and Calculation, Comparison of magnetic & Electric Circuit, Magnetization Curves, review of Faraday's Law, Lenz's Law, Self & Mutual Inductance, Inductance of coupled circuits.	
<b>Unit – III</b>	<b>3.0 A.C. Circuits</b>	06
	Generation of A.C. Voltage, Equation of A.C. Voltage, Average value, R.M.S. Value, Form Factor, Peak Factor, Phase & Phase Difference, Pure Resistive, Pure Inductive, Pure Capacitive and combination of R-L-C Circuits, Active -Reactive and Apparent power & Power Factor, Generation of 3-phase voltage, Phase Sequence, Interconnection of three phase, Star – Delta, Voltage, Current & Power relationship in balanced 3-Phase Circuits, Measurement of power in 3-phase circuit and Effect of power factor on Wattmeter readings.	
<b>Unit – IV</b>	<b>4.0 Semiconductors</b>	06
	Semiconductors (p-type, n-type), pn junction diodes, pn junction as a circuit element, its characteristics, half wave, full wave and bridge type rectifier circuits, basic filter circuits, Diode as a voltage multiplier, clipper & clamper circuit. Zener diode as a voltage regulator. LED, its characteristics construction & applications.	
<b>Unit – V</b>	<b>5.0 Transistors</b>	06
	Definition of transistors, Characteristics of transistors in different configuration. Concept of d.c. and a.c. load line and operating point selection. Various amplifiers configurations their h-parameter equivalent circuits, determination of voltage gain current gain, input resistance and output resistance & power gain. Concept of feedback in amplifiers, different oscillators circuits (without analysis).	
<b>Unit – VI</b>	<b>6.0 Amplifiers</b>	06
	Differential amplifier and its transfer characteristics. IC Op-Amps, its ideal & practical specifications and measurement of parameters. Op-Amp in different modes as inverting amplifier, non-inverting amplifier, scale changer, differentiator & integrator.	

#### **Recommended Books:**

- U.A.Patel, "Elements of Electrical & Electronics Engineering", Atul Prakashan.
- B.L. Thereja, "Electrical Technology", S.Chand Volume-I.
- Principles of Electronics – V.K. Mehta, Shalu Mehta.
- Electronic Principles – Malvino

<b>Subject Name: Identification of Components, Connectors, Cables and Applications</b>		
<b>Course Code :BVEMC102</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --</b>	
<b>Credit :03</b>		
<b>Content</b>		<b>Hours</b>
<b>Unit – I</b>	<b>Passive Components</b>	07
	<p>Definition, why called Passive Components, Resistor – Identification value using Color coding, using numbering in case of SMD, Resistor Type – Carbon Film, Metal Film, Ceramic, Wire Wound (Fixed and Tapped), Preset (Adjustable Resistor), Potentiometer (Variable Resistor), Light Dependent Resistor, Thermistor.</p> <p>Capacitor – Identification value using Color coding, using numbering in case of SMD, Type – Non-Polar – Ceramic (Disc), Polyester, Paper, Mica, Adjustable Capacitor – Trimmer (Adjustable), Gang Capacitor (Variable), Polar – Tantalum, Electrolytic.</p> <p>Inductor – Identification value using Color coding, applications.</p> <p>Intermediate Frequency Transformer (IFT).</p> <p>Transformers – Step-up, Step-down, Isolation.</p> <p>Relay (Electromechanical Switch))</p>	
<b>Unit – II</b>	<b>Active Components</b>	07
	<p>Definition, why called Active Components, Diode – Diode (General Purpose), LED, Zener (Reference Voltage), Display (7-Segment), Photo Diode, PIN Diode, Schottky Diode, Tunnel Diode.</p> <p>Transistor – BJT (Current Operated Device), Photo Transistor, Power Transistor, FET, MOSFET, SCR (Controlled Diode), Diac (Bidirectional AC switch), Triac (Bidirectional Controlled AC switch), IGBT</p>	
<b>Unit – III</b>	<b>Switches</b>	05
	<p>Identification and application of Mechanical Switches – SPST, SPDT, DPST, DPDT, Push Button, Toggle Switch, Limit Switch, Float Switch, Flow Switch, Pressure Switch, Temperature Switch, Joystick, Rotary Switch, Rocker Switch.</p> <p>Identification and application of Mechanical Switches – BJT, Photo Transistor, Power Transistor, FET, MOSFET, SCR, Diac, Triac, IGBT.</p> <p>Identification and application of Optocoupler.</p>	
<b>Unit – IV</b>	<b>Connectors</b>	05
	<p>Plug and socket connectors, Jacks and plugs, <b>Crimp</b>-on connectors, Soldered connectors, Insulation-displacement connectors, Binding posts, Screw terminals, Ring and spade connectors, Blade connectors etc.</p>	
<b>Unit – V</b>	<b>Cables</b>	06
	<p>Identification and application of cables – Metallic Sheathed and Non-metallic Sheathed cable, Un-grounded and Grounded Power Supply Cable, multi-conductor Cable, Coaxial Cable, Shielded and Unshielded Twisted Pair Cable, Ribbon Cable, Armoured and Unarmoured Cable, Twin-Lead Cable, Twin Axial Cable, Optical fiber Cable</p>	

<b>TextBooks</b>		
<b>NameofAuthors</b>	<b>Title oftheBook</b>	<b>Publisher</b>
R. Hunt And Shell Y.	Computers And Commonsense	BPB Publications
V.Rajaraman	Computer Fundamentals	PHI Learning
<b>Reference Books</b>		
Ashok Arora	Fundamentals of Computer Systems.	
Russell A Stultz	Fundamentals of Computer Systems	

Subject Name: <b>Basic Instrumentation</b>		
<b>Course Code :BVEMC103</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --25 Practical 25 Term</b>	
<b>Credit :03</b>		
Content		Hours
<b>Unit – I</b>	<b>1.0 Fundamentals of measurement</b>	06
	Need of Instrumentation, General Instrumentation System, Static and Dynamic characteristics of instruments, input & output impedance, loading effects of series and shunt connected instruments, Fundamentals of measurements, Types of Errors, Statistical Analysis, Probability of Errors, Limiting Errors, Calibration of instruments, calibration report & certification, traceability and traceability chart	
<b>Unit – II</b>	<b>2.0 Analog Indicating Instruments</b>	06
	DC galvanometer, PMMC and Moving Iron instruments, voltmeters, ammeters, ohmmeters and extension of range of instruments, AC indicating instruments: EDM type instruments, EDM Wattmeter (single phase) and errors present, $I \Phi$ induction type energy meter, Potential and current transformers, DC Potentiometers, standardization, applications of DC potentiometer	
<b>Unit – III</b>	<b>3.0 Bridge Circuits</b>	06
	DC bridges: Wheatstone bridge and Kelvin bridge design, bridge sensitivity, errors in bridge circuits, null type and deflection type bridges, current sensitive and voltage sensitive bridges, applications of DC bridges AC bridges: Quality factor (Q) and dissipation factor (D), General equations for bridge balance, detectors for AC bridges, Maxwell bridge, Hay bridge, Schering bridge, Wien bridge, applications of AC bridges	
<b>Unit – IV</b>	<b>4.0 Oscilloscope</b>	06
	Introduction, General purpose oscilloscope Block Diagram, Cathode Ray Tube, Vertical Deflection System, Horizontal Deflection System, deflection sensitivity, front panel controls, Delay Line, Oscilloscope Probes, Dual trace CRO, ALT and CHOP modes, measurement of electrical parameters like voltage, current, frequency, phase, Z modulation, Digital Storage oscilloscope, sampling rate and bandwidth, roll mode, applications like pretrigger, post-trigger, zoom and restart	
<b>Unit – V</b>	<b>5.0 Digital Instruments</b>	06
	Introduction to digital instruments, Advantages of Digital instruments over Analog instruments, Block diagram, principle of operation, Accuracy of measurement: Digital Multimeter, Kilo Watt Hour meter, Digital Tachometer, Ultrasonic Distance meter, Digital Thermometer, Digital pH meter, Digital capacitance meter	
<b>Unit – VI</b>	<b>6.0 Recording Instruments and Waveform Generation</b>	06
	Classification of recorders, Principle and working of strip chart and X-Y recorders, single and multi-channel recorders, driving systems for pen and chart, applications of recorders, Waveform generation methods, Function generator	

#### Recommended Text and Reference Books:

1. Sawhney A. K., Electrical and Electronics Measurements and Instruments
2. W. D. Cooper & A. D. Helfrick, 'Electronic Instrumentation and Measurement Techniques', PHI
3. Kalsi H. S., 'Electronic Instrumentation', TMH, 2nd or 3rd e/d



Subject Name: <b>IT foundation and Programming Concepts</b>		
<b>Course Code :BVIMC102</b>		<b>Semester: I</b>
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>		<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>
<b>TH Exam Duration: 01 Hours</b>		<b>Scheme of Marking PR: --</b>
<b>Credit :03</b>		
Content		Hours
<b>Unit – I</b>	<b>1.0 Computer System Characteristics And Capability</b>	06
	Basic structure, ALU, memory, CPU, I/O devices. Development of computers. Classification of computers:(Micro, mini frame, super computer, pc, server, workstations)	
<b>Unit – II</b>	<b>2.0 Data Representation With in Computer</b>	06
	BIT, BYTE, WORD, ASCII, EBCDIC, BCD Code. Introduction to Number system: Binary, Octal, Decimal and Hexadecimal. Conversation from one number system to another number system. Introduction to Basic Gates.	
<b>Unit – III</b>	<b>3.0 Input Devices and Output Devices</b>	06
	Keyboard, Direct Entry: Card readers, scanning devices (BAR CODE, OMR, MICR), Voice input devices, Light pen, Mouse, Touch Screen, Digitizer, scanner. CRT, LCD/TFT, Dot matrix printer, Inkjet printer, Drum plotter, Flatbed plotter	
<b>Unit – IV</b>	<b>4.0 Memory Devices</b>	06
	RAM, ROM, PROM, EPROM, EEPROM. - Base memory, extended memory, expanded memory, Cache memory - Storage devices Tape, FDD, HDD, CDROM, Pen Drive.	
<b>Unit – V</b>	<b>5.0 Algorithm &amp; Flowcharts</b>	06
	Definition and properties, Principles of flowcharting, Flowcharting symbols, Converting algorithms to flowcharts	
<b>Unit – VI</b>	<b>6.0 Introduction To Programming Environment</b>	06
	History of languages, high-level, Low level, Assembly languages etc. ,Compilers, Interpreters, Assemblers, Linkers, Loaders	

<b>TextBooks</b>		
<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Publisher</b>
R. Hunt And Shell Y.	Computers And Commonsense	BPB Publications
V. Rajaraman	Computer Fundamentals	PHI Learning
<b>Reference Books</b>		
Ashok Arora	Fundamentals of Computer Systems.	
Russell A Stultz	Fundamentals of Computer Systems	

## **Lab- Elements of Electrical and Electronics Engineering**

Course Code : <b>BVSWL105</b>	Semester: <b>I</b>
Weekly Practicals: PR: <b>01</b> Tut: <b>00</b>	Scheme of Marking TH: --
TH Exam Duration:--	Scheme of Marking PR: <b>25</b> , IA: <b>25</b> , Total: <b>50</b>
Credit:1.5	

### **Content**

#### **List of Experiments :**

1. Verification of KCL and KVL
2. Measurement of Impedance of R-L, R-C,R-L-C & study of resonance phenomena
3. Measurement of power & power factor in a single phase AC circuit using three Ammeter Method
4. Measurement of active and reactive power in single phase A.C. Circuit
5. Identification of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (Germanium, point contact, silicon low power, high power and switching diode)
6. Testing of various passive and active components
7. Plotting of forward V-I characteristics for a point contact and P-N junction diode (Silicon& Germanium diode).
8. To Plot forward and reverse V-I characteristics for a Zener diode
9. To Plot the input and output characteristics and calculation of parameters of a transistor in common base configuration
10. To Plot input and output characteristics and calculation of parameters of a transistor in common emitter configuration.

## **Lab- Identification of Components, Connectors, Cables and Applications Lab**

Course Code : <b>BVEML106</b>	Semester: <b>I</b>
Weekly Practicals: PR: <b>01</b> Tut: <b>00</b>	Scheme of Marking TH: --
TH Exam Duration:--	Scheme of Marking PR: <b>25</b> , IA: <b>25</b> , Total: <b>50</b>
Credit:1.5	

### **Content**

#### **List of Experiments :**

1. Identify Non-Metallic and Metallic Sheathed Cable, How it works and explain its real world applications.
2. Identify Un-Grounded and Grounded Power Supply Cable, How it works and explain its real world applications.
3. Identify Multi-Conductor Cable, How it works and explain its real world applications.
4. Identify Coaxial Cable, How it works and explain its real world applications.
5. Identify Unshielded and shielded Twisted Pair Cable, How it works and explain it's real world applications.
6. Identify Ribbon Cable, How it works and explain its real world applications.
7. Identify Armoured and Unarmoured Cable, How it works and explain it's real world applications.
8. Identify Twin-Lead Cable, How it works and explain its real world applications.
9. Identify Twin Axial Cable, How it works and explain its real world applications.
10. Identify Optical Fiber Cable, How it works and explain its real world applications.
11. Identify "Plug and socket connectors" Connector, How it works and explain its real world applications.
12. Identify "Jacks and plugs", How it works and explain its real world applications.
13. Identify "**Crimp**-on connectors" Connector, How it works and explain its real world applications.
14. Identify "Soldered connectors", How it works and explain its real world applications.
15. Identify "Insulation-displacement" Connector, How it works and explain its real world applications.
16. Identify "Binding posts" Connector, How it works and explain its real world applications.
17. Identify "Screw terminals" Connector, How it works and explain its real world applications.
18. Identify "Ring and spade" Connector, How it works and explain its real world applications.
19. Identify "Blade" Connector, How it works and explain its real world applications.

**Semester I - On-Job-Training (OJT)/Qualification Pack**

**Group GEM1 of Qualifier Packs**

<b>Subject Name: Electrical Technician ( ELE/Q6301)</b>	
Course Code : <b>BVEME117</b>	Semester: <b>I</b>
Weekly Skilling Hours: PR: <b>24</b> Tut: <b>00</b>	Scheme of Marking TH: <b>00</b> , IA: <b>00</b> , Total: <b>00</b>
PR Exam Duration: <b>06 Hours</b>	Scheme of Marking PR: 150, IA: 50, Total: <b>200</b>
Credit: <b>15</b>	<b>Choose any one from specified Group GEM1 of Qualification Packs</b>
<b>Syllabus for this qualifier Pack is available on</b> <b><a href="https://nsdcindia.org/sites/default/files/MC_ELEQ6301_V1.0_Electrical%20Technician_23.08.2019.pdf">https://nsdcindia.org/sites/default/files/MC_ELEQ6301_V1.0_Electrical%20Technician_23.08.2019.pdf</a></b>	

**Semester**

**II**

**Syllabus**

Subject Name: <b>Sensors and Transducers</b>		
<b>Course Code :BVEMC201</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --</b>	
<b>Credit :03</b>		
Content		Hours
<b>Unit – I</b>	<b>1.0 Introduction</b>	06
	Measurement and measurement system, industrial measuring parameters and their units, definitions of sensors and transducers, classification of transducers, static and dynamic characteristics, selection criteria, importance.	
<b>Unit – II</b>	<b>2.0 Displacement Measurement</b>	06
	Resistive: Potentiometer, Strain gauges, Inductive: LVDT and Eddy current type, Capacitive: Capacitance pickups, Differential capacitive type, Piezoelectric, Ultrasonic transducers and Hall effect transducers, Optical transducers	
<b>Unit – III</b>	<b>4.0 Velocity, Speed, Vibration and Acceleration measurement</b>	06
	Velocity and Speed: Electromagnetic tachometer, Photoelectric tachometer, Toothed rotor variable reluctance, tachometer. Magnetic pickups, Encoders, Photoelectric pickups, Stroboscopes, Shaft speed measurement. Vibration and acceleration: Eddy current type, piezoelectric type, Seismic Transducer, Accelerometer: Potentiometric type, LVDT type, Piezo-electric type	
<b>Unit – IV</b>	<b>5.0 Force and torque measurement</b>	06
	Basic methods of force measurement, elastic force transducers, strain gauge, load cells, piezoelectric force transducers, vibrating wire force transducers, Strain gauge torque meter, Inductive torque meter, Magnetostrictive transducers, torsion bar dynamometer, etc. Dynamometer (servo control and absorption) instantaneous power measurement and alternator power measurement.	
<b>Unit – V</b>	<b>6.0 Pressure measurement</b>	06
	Definition, pressure scale, standards, working principle, types, materials, design criterion: Manometers, elastic pressure sensors, secondary pressure sensors, differential pressure sensors, force balance type, motion balance, type, capacitive (delta cell), ring balance, vibrating cylinder type, high-pressure gauges, vacuum gauges, deadweight and vacuum gauge tester.	
<b>Unit – VI</b>	<b>Temperature measurement</b>	06
	Temperature Scales, Standards and Units and relations, Classification of temperature sensors Bimetallic Thermometer, Filled system thermometers, SAMA classifications, Resistance Temperature Detectors (RTD), Thermistor, Thermocouples, Study of thermocouple tables (calculation of intermediate temperature and voltage), Lead wire compensation, Cold junction compensation techniques, Protection (Thermowell), Thermopiles, Pyrometers, Temperature IC sensors (AD590 and LM35).	

#### Recommended Books:

- B. C. Nakra and K. K. Choudhari, "Instrumentation Measurements and Analysis", Tata McGraw Hill Education.
- D. Patranabis, "Principle of Industrial Instrumentation", Tata McGraw Hill.
- D.V.S. Murty, "Instrumentation and Measurement Principles", PHI, New Delhi.

<b>Subject Name: Analog and Digital Electronics</b>		
<b>Course Code :BVEMC202</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --25 Practical 25 Term</b>	
<b>Credit :03</b>		
<b>Content</b>		<b>Hours</b>
<b>Unit – I</b>	<b>1.0 Differential, Multi-Stage And Operational Amplifiers</b>	06
	Differential, multi-stage and operational amplifiers, Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product), Superposition Theorem, Thevenin's Theorem, Norton's & Maximum Power Transfer	
<b>Unit – II</b>	<b>2.0 Linear Applications Of Op-Amp</b>	04
	Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion	
<b>Unit – III</b>	<b>3.0 Nonlinear Applications Of Op-Amp</b>	04
	Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector	
<b>Unit – IV</b>	<b>4.0 Combinational Digital Circuits</b>	08
	Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization	
<b>Unit – V</b>	<b>5.0 Sequential Circuits And Systems</b>	08
	A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J- K-T and D types flip-flops, applications of flip-flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters	
<b>Unit – VI</b>	<b>6.0 A/D and D/A Converters</b>	08
	Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs	

**Recommended Books:**

- J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
- P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
- Ramakant A Gayakwad, Op- Amps and Linear Integrated Circuits, Prentice Hall of India
- R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

<b>Subject Name: Electrical Drives &amp; Control</b>		
<b>Course Code :BVEMC203</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --25 IA: 25 Total: 50</b>	
<b>Credit :03</b>		
<b>Content</b>		<b>Hours</b>
<b>Unit – I</b>	<b>1.0 Introduction</b>	06
	Basic elements-types of electric drives-factors influencing electric drives-heating and cooling curvesloading conditions and classes of duty-Selection of power rating for drive motors with regard to	
<b>Unit – II</b>	<b>2.0 Drive Motor Characteristics</b>	08
	Mechanical characteristics- speed- torque characteristics of various types of load and drive motors -braking of electrical motors-dc motors: shunt, series, compound motors-single phase and three phaseinduction motors	
<b>Unit – III</b>	<b>4.0 Starting Methods</b>	06
	Types of DC motor starters-typical control circuits for shunt and series motors-three phase squirrel andslip ring induction motors	
<b>Unit – IV</b>	<b>5.0 Conventional And Solid State Speed Control Of D.C Drives</b>	08
	Speed control of DC series and shunt motors-Armature and field control, Ward-Leonard control systemusing controlled rectifiers and DC choppers –applications.	
<b>Unit – V</b>	<b>6.0Conventional And Solid State Speed Control Of AC Drives</b>	08
	Speed control of three phase induction motor-Voltage control, voltage/frequency control, slip powerrecovery scheme-using inverters and AC voltage regulators-applications	

### **Text Books**

1. Vedam Subramaniam “Electric drives (concepts and applications)”, Tata McGraw-Hill.2001
2. Nagarath.I.J& Kothari .D.P,”Electrical machines”, Tata McGraw-Hill.1998

### **References**

1. Pillai.S.K “A first course on Electric drives”, Wiley Eastern Limited, 1998
2. M.D. Singh, K.B.Khanchandani,”Power electronics,” Tata McGraw-Hill.1998
3. H.Partab,”Art and science and utilization of electrical energy,”Dhanpat Rai and sons, 1994



<b>Subject Name: Soldering, De-soldering Components and Emergency Actions</b>		
<b>Course Code :BVEMC204</b>	<b>Semester: I</b>	
<b>Weekly Teaching Hours: TH: 03 Tut: 00</b>	<b>Scheme of Marking TH: 25 IA: 25 Total: 50</b>	
<b>TH Exam Duration: 01 Hours</b>	<b>Scheme of Marking PR: --</b>	
<b>Credit :03</b>		
<b>Content</b>		<b>Hours</b>
<b>Unit – I</b>	<b>Soldering and De-soldering Tools</b>	08
	Soldering tools and their applications – Soldering Iron (i.e. Temperature and Wattages), Types of Solder Iron Tip, Solder Iron Stand, Solder metal and its grading, Soldering and De-soldering Stations and their specifications, Flux and its types, De-soldering Pump, De-solder wick, Hot-gun station etc.	
<b>Unit – II</b>	<b>PCB</b>	08
	What is PCB, Why PCB used, Types of PCB – single layer, double layer and multilayer, PCB making processes, PCB design rules,	
<b>Unit – III</b>	<b>Soldering and De-soldering Component</b>	08
	Understand Procedure of Soldering and De-soldering, Soldering and De-soldering basic Components on PCB, Identification of 2, 3, 4 and multi terminal SMD components , use of SMD components and ICs, Identification of crimping tools for various IC packages. Soldering and De-soldering SMD Components on PCB.	
<b>Unit – IV</b>	<b>PCB Testing</b>	08
	PCB fault identification by visual inspection, test continuity of PCB, Identification of loose / dry solder, broken tracks on printed wire assemblies and discrete components mounted circuit boards, Join the broken PCB track and test	
<b>Unit – V</b>	<b>Emergency Actions</b>	08
	Identification of Emergency Actions and minimum requirements to escape, Reporting Emergencies, Emergency Exits, Primary and Secondary evacuation routes, Locations for fire extinguishers, Fire alarm pull station location, assembly points, Medical Services	

<b>Books</b>		
<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Publisher</b>
R. Sengupta	Principles of Reliable Soldering Techniques	New Age International
Ray P. Prasad	Surface Mount Technology: Principles and Practice	Springer
Mel M. Schwartz	Soldering: Understanding the Basics	ASM International
John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel	Electrical Safety Handbook 3E	Delmar
W Fordham Cooper	Electrical Safety Engineering	Newnes-Butterworths

## **Lab- Analog and Digital Electronics**

Course Code : <b>BVEML205</b>	Semester: <b>I</b>
Weekly Practicals: PR: <b>01</b> Tut: <b>00</b>	Scheme of Marking TH: --
TH Exam Duration:--	Scheme of Marking PR: <b>25</b> , IA: <b>25</b> , Total: <b>50</b>
Credit:1.5	

### **Content**

#### **List of Experiments :**

1. Study the different parameter of op-amp.
2. Frequency response of inverting amplifier and non-inverting amplifier.
3. Study of op-amp as inverting amplifier and non-inverting amplifier.
4. OPAMP circuits –integrator, differentiator, and comparator.
5. Waveform generation – Square, triangular and saw tooth wave form generation using OPAMPs.
6. Application of op-amp as low pass filter, high pass filter and band-pass filter.
7. Verification of function of Half/Full adder circuits.
8. Verification of function of Binary to Grey code conversion.
9. Verification of function of Latch and flip-flop.
10. Verification of counter circuit like binary up/down counter, decimal counter, ring counter, Johnsoncounter etc.
11. Verification of Specification and Performance indices of D/A and A/D converters

## **Lab- Electrical Drives and Control**

Course Code : <b>BVEML206</b>	Semester: <b>I</b>
Weekly Practicals: PR: <b>01</b> Tut: <b>00</b>	Scheme of Marking TH: --
TH Exam Duration:--	Scheme of Marking PR: <b>25</b> , IA: <b>25</b> , Total: <b>50</b>
Credit:1.5	

### **Content**

#### **List of Experiments :**

1. To study the fundamental and block diagram of Electric drive.
2. To study different methods of speed control of D.C. Motor.
3. To study and simulate 1- F Semi Control of D.C. separately excited Motor.
4. To study and simulate 1- F Fully Controlled converter of separately excited Motor.
5. To study the control techniques used in D.C. chopper.
6. To study control of D.C. motor for (a) Current limit control (b) Closed loop torque control(c) Closed loop speed control.
7. To study chopper control of D.C. Motor for motoring and generating control.
8. To study D.C. Motor drive using PLL.
9. To study and simulate AC voltage controller based speed control of AC motor.
10. To study and simulate Inverter based speed control of Induction/Synchronous motor.

## Group GEM2 of Qualifier Packs

<b>Subject Name: Smartphone Repair Technician (ELE/Q8104)</b>	
Course Code : <b>BVEME217</b>	Semester: <b>II</b>
Weekly Skilling Hours: PR: <b>24</b> Tut: <b>00</b>	Scheme of Marking TH: <b>00</b> , IA: <b>00</b> , Total: <b>00</b>
PR Exam Duration: <b>06 Hours</b>	Scheme of Marking PR: <b>150</b> , IA: <b>50</b> , Total: <b>200</b>
Credit: <b>15</b>	<b>Choose any one from specified Group GEM2 of Qualification Packs</b>
Syllabus for this qualifier Pack is available on <a href="http://essc-india.org/assets/qp-commn-smartphone-repair-technician.pdf">http://essc-india.org/assets/qp-commn-smartphone-repair-technician.pdf</a>	

<b>Subject Name: Business Development Executive (ELE/Q1101)</b>	
Course Code : <b>BVEME228</b>	Semester: <b>II</b>
Weekly Skilling Hours: PR: <b>24</b> Tut: <b>00</b>	Scheme of Marking TH: <b>00</b> , IA: <b>00</b> , Total: <b>00</b>
PR Exam Duration: <b>06 Hours</b>	Scheme of Marking PR: <b>150</b> , IA: <b>50</b> , Total: <b>200</b>
Credit: <b>15</b>	<b>Choose any one from specified Group GEM2 of Qualification Packs</b>
Syllabus for this qualifier Pack is available on <a href="http://nqr.gov.in/sites/default/files/QP-Business%20Development%20Executive.pdf">http://nqr.gov.in/sites/default/files/QP-Business%20Development%20Executive.pdf</a>	

\*Skill Practical assessment will be done rules/ procedure of respective Skill Sector Council of India.