Sri Ramakrishna Mission Vidyalaya College of Arts and Science
Coimbatore – 641020

(An Autonomous College Re-Accredited with "A" grade by NAAC and Affiliated to
Bharathiyar University, Coimbatore)

B.Voc., Degree course (Three years)
Technology in Electrical and Electronic Devices
(An UGC sponsored DDU-KAUSHAL KENDRA Programme)

SYLLABUS

(ACADEMIC YEAR 2019-2020 Onwards)

Sri Ramakrishna Mission Vidyalaya College of Arts and Science
(AUTONOMOUS)

For Students admitted from 2019-2020 & onwards

COURSE OF STUDY

- Syllabus is framed for B.VOC (Technology in Electrical and Electronic Devices) according to UGC norms and National Vocational Education Quality Framework
- There are 2 components. They are General components of 24 credits and Skill components of 36 credits.
- One credit is equal to 15 hours for theory and 30 hours for practical. Practical could be either in the campus or in the working place of the Industry.

ELIGIBILITY:

- Candidates who have successfully completed their Higher Secondary (10+2) will be eligible for admission.

PROGRAMME OUTCOMES:

The Department of Technology in Electrical and Electronic Devices provides the practical learning environment for the students which aim to meet out the industrial requirements in the field of Electrical and Electronics by providing more practical exposures and on job trainings.

The program Educational Objectives are as follows:

PO1: Provide graduates with the fundamental knowledge in science and mathematics required to understand the principles of Engineering.

PO2: Develop creative and innovative thinking ability of the students which are required for industry.

PO3: Create a technically skilled employee by imparting theoretical, practical and on job training to students.

PO4: Imparting the leadership qualities required for team work, production planning, decision making and industrial safety, so that they are work ready at exit point of the programme.

PO5: Create well disciplined and responsible citizens for the overall welfare of our nation.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Ability to apply the knowledge of basic Engineering principles in the field of Electrical and Electronics.

PSO2: Ability to design a system to meet out the desired needs of realistic constraints.

PSO3: Ability to troubleshoot and solve the problems in the area of Electronics.

PSO4: Ability to Coordinate with Multidisciplinary teams, allocate work and manage team to ensure that production deadlines and quality standards of an industry.

PSO5: Ability to use techniques, Skills and modern engineering tools required to develop new product with updated features and improved performance.

BASICS OF ELECTRICAL AND ELECTRONIC DEVICES

Subject code	18KUT1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

Course Outcomes (CO)

CO1	Remembering the fundamentals of Electricity	K
CO2	Understand the construction, characteristics and Application of DC Machines	K& U
CO3	Understand the construction, characteristics and Application of AC Machines	K & U
CO4	Understand and analyze the Characteristics and specification of Electronic Devices.	K & U
CO5	Understand and analyze the construction and working of basic Electronic circuits.	K,U& S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M		S	M	S	L	L
CO2	S	S	S	M	M		S	M	S	L	L
CO3	S	S	S	M	M		S	M	S	L	L
CO4	S	S	S	M	M		S	M	S	L	L
CO5	S	S	S	M	M		S	M	S	L	L

S – Strong; M – Medium;L – Low

SUPERVISE ASSEMBLY LINE ACTIVITIES

Subject code	19KUT1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

Course Outcomes (CO)

CO1	Understand the responsibilities of supervisor.	U
CO2	Understand the skills required for the supervisor.	U & S
CO3	Apply the Safety Guidelines for Handling Electronic Assemblies and to achieve productivity	K & U
CO4	Apply safety procedures by understanding the importance of Electrical Safety.	K & U
CO5	Understand and Analyze the importance of time management.	U

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	L	L	S	M		L	S	M	S	S
CO2	S	M	M	S	S		L	S	S	S	S
CO3	S	M	S	S	S		M	S	M	S	M
CO4	S	M	S	S	S		M	S	M	S	M
CO5	M	M	L	S	S		L	S	L	S	S

S – Strong; M – Medium; L - Low

LINEAR INTEGRATED CIRCUITS

Subject code	18KUT2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

Course Outcomes (CO)

CO1	Understand the characteristics of Op-amp IC741	K
CO2	Understand and analyze the applications of IC741	K & U
CO3	Understand different types of A to D and D to A converters.	K
CO4	Understand the characteristics and application of timer Ic's	K & U
CO5	Developing competencies to analyze Linear integrated circuits by understanding the fundamentals of OP-amp and Timer IC's.	U & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S	S	M	M	L	L
CO2	S	S	M	M	S	S	M	S	L	L
CO3	S	S	M	M	S	S	M	M	L	L
CO4	S	S	M	M	S	S	S	S	L	L
CO5	S	S	S	M	S	S	S	S	L	L

S – Strong; M – Medium; L – Low

DIGITAL ELECTRONICS

Subject code	18KUT3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

Course Outcomes (CO)

CO1	Understand various types of number systems, binary arithmetic and codes.	K
CO2	Remembering truth table, symbol and equation of various logic gates	K
CO3	Analyze combinational Logic circuits and sequential Logic circuits	K & U
CO4	Understand the circuit and working of Registers and digital memories.	K
CO5	Developing competencies to design Digital logic circuits by understanding the fundamentals of Logic gates and Flip flops.	U & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	M	S	M	M	L	L
CO2	S	S	S	M	S	S	S	S	M	L
CO3	S	S	S	M	S	S	S	S	M	L
CO4	S	S	S	M	S	S	S	S	M	L
CO5	S	S	S	M	S	S	S	S	M	L

S – Strong; M – Medium; L - Low

PRODUCTION PLANNING AND CONTROL

Course code	18KUT3C05	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

Course Outcomes (CO)

CO1	Understand the objectives of Production and operation managements systems.	U
CO2	Originate a procurement chart based on production plan for future months	U & S
CO3	Understand the importance of man power planning.	U
CO4	Understand purchasing management and inventory control	U
CO5	Analyze the production plan based on the product demand data.	K & U

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	S		M	M	S	S	S
CO2	M	S	M	S	S		M	S	S	S	M
CO3	L	M	M	S	S		M	S	S	S	S
CO4	L	M	L	S	S		M	S	M	S	M
CO5	M	M	M	S	S		M	S	S	S	S

S – Strong; M – Medium; L - Low

TECHNICAL DRAWING

Subject code	18KUG4AL4	Credits		4	Year	II
No. of Lecture Hours	60	No. of Practical Hours		-	Sem	IV

Course Outcomes (CO)

CO1	Apply the Skill in the Geometric construction.	K & S
CO2	Understand and Develop the Orthographic and Isometric projections.	U & S
CO3	Remember the symbols widely used in Electrical and Electronics circuits.	K & U

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	L	M		M	S	M	L	L
CO2	M	S	M	L	M		M	S	M	L	L
CO3	S	S	M	L	S		M	S	M	L	L

S – Strong; M – Medium; L - Low

PRINCIPLES OF MANAGEMENT

Subject code	18KUG4EL1	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Course Outcomes (CO)

CO1	Understand the basic managerial functions of an organization	U
CO2	Develop the leadership qualities and planning attitude	K & U

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	L	L	L	S	M	L	M	M	S	S
CO2	M	M	M	S	M	L	S	S	S	S

S – Strong; M – Medium; L - Low

PROGRAMMABLE LOGIC CONTROLLER

Course code	19KUT4C06	Credits	04	Year	II
No. of Lecture	60	No. of Practical	--	Sem	IV

Course Outcomes (CO)

CO1	Remembering general block diagram and connectivity of PLC	K
CO2	Understand the various Classification PLC programming standards	K & U
CO3	Understand input, output, timer and counter instructions	K & U
CO4	Understand the Arithmetic and Logical Instructions	K & U
CO5	Understand and Write the PLC Ladder logic program for various Applications.	K,U& S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	L	M		M	S	M	L	L
CO2	S	S	S	L	M		M	S	S	L	L
CO3	S	S	S	L	M		M	S	S	L	L
CO4	S	S	S	L	M		M	S	S	L	L
CO5	S	S	S	L	S		M	S	S	L	L

S – Strong; M – Medium; L - Low

Total Quality Management

Subject code	18KUG5EL2	Credits		04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem		V

Course Outcomes (CO)

CO1	Gain the knowledge of Quality management principles and Techniques.	K
CO2	Understand the importance of the Quality and apply in industry.	U & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	L	M	L	S	S		L	M	M	S	S
CO2	L	M	L	S	S		L	M	M	S	S

S – Strong; M – Medium; L - Low

MICROPROCESSOR AND MICROCONTROLLER

Subject code	18KUT5C07	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Course Outcomes (CO)

CO1	Understand the architecture, addressing modes and instructions of 8085 Microprocessor.	U
CO2	Understand the architecture, pin diagram of 8051 Microcontroller.	U
CO3	Understand Addressing Modes, Data transfer and Logical instruction of 8051 Microcontroller	K & U
CO4	Understand Arithmetic and Branching instruction of 8051 Microcontroller	K & U
CO5	Analyse various interfacing application of 8051 Microcontroller.	K & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	L	S	S	S	S	L	L
CO2	S	S	S	L	S	S	S	S	L	L
CO3	S	S	S	L	S	S	S	S	L	L
CO4	S	S	S	L	S	S	S	S	L	L
CO5	S	S	S	L	S	S	S	S	L	L

S – Strong; M – Medium; L - Low

DEVELOP HARDWARE PRODUCT FOR MANUFACTURING

Subject code	18KUT5C08	Credits		04	Year	III
No. of Lecture Hours	60	No. of Practical Hours		--	Sem	V

Course Outcomes (CO)

CO1	Identify Material requirement and selection of supplier	K & U
CO2	Understand various planning and work study	U
CO3	Recognize the requirements for developing the hardware product	U & S
CO4	Understand the basic troubleshooting procedure in Electronic Equipments	U
CO5	Analyze Quality control and waste management	K & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	M		L	M	M	S	S
CO2	M	M	M	S	M		L	M	M	S	S
CO3	S	S	S	L	S		S	S	S	L	L
CO4	S	S	S	L	S		S	S	S	L	L
CO5	S	M	M	S	S		M	S	S	S	S

S – Strong; M – Medium; L - Low

PROFESSIONAL ETHICS AND HUMAN VALUES

Subject code	18KUG6EL4	Credits	4	Year	III
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	VI

Course Outcomes (CO)

CO1	Create awareness of Ethics and moral values.	K & U
CO2	Understand the importance of Ethics and code of conduct in business.	K & U
CO3	Understand social responsibility in business and importance of human values	U & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	L	L	L	S	M	L	L	L	S	S
CO2	L	L	L	S	M	L	L	L	S	S
CO3	L	L	L	S	M	L	L	L	S	S

S – Strong; M – Medium; L - Low

Safety Engineering

Subject code	18KUG6EL5	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Course Outcomes (CO)

CO1	Understand the importance of safety.	U
CO2	Able to handle the materials and tools safely.	K,U& S
CO3	Follow the road and electrical safety.	U & S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	M	M	M	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S

S – Strong; M – Medium; L - Low

Entrepreneurship Development

Subject code	18KUG6EL6	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Course Outcomes (CO)

CO1	Understand concept of finance institutions, project report, incentives and subsidies.	U
CO2	Develop the qualities to become an entrepreneur	K,U& S

K- Knowledge, U – Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	M	M	L	S	M	L	M	M	S	S
CO2	M	M	M	S	M	L	M	M	S	S

S – Strong; M – Medium; L - Low

BASICS OF ELECTRICAL AND ELECTRONIC DEVICES

Course code	18KUT1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

UNIT I: FUNDAMENTALS OF ELECTRICITY

Definition and Units of Voltage, Current, Potential Difference, Power, Energy, Resistance, Conductance, Resistivity - Concepts of open and short circuit - Ohm's Law –Kirchoff's Current and Voltage law (Definition only) - Series circuits - Parallel circuits – Series Parallel Circuits – Simple problems on Ohm's law. AC and DC circuits-sources and its applications - Definition of cycle, frequency, time period, amplitude, peak value, average value and rms value – Define peak factor and form factor - Concept of phase , phase difference and phase angle – Single phase and 3 phase (Definition) - Meaning of lagging and leading sine wave - Advantages of three phase over single phase

UNIT II: D.C. MACHINES

DC Generator – construction- Working principle - characteristics–types- Applications DC motor- construction- Working principle - characteristics–types- Applications Necessity of starter - 3 point starter, 4 point starter

UNIT III: A.C.MACHINES AND TRANSFORMERS

Single phase Induction motor - construction & principle of operation-Types
Three phase induction motors – Squirrel cage and slip ring Induction motors (construction and working principle only)
Alternator- construction – Principle of operation
Necessity of starters – DOL and star/delta, auto transformer –application
Single Phase transformer: Working Principle and Construction of transformer – Applications – Step up and Step down transformer (Definition only)

UNIT IV: ELECTRONICS DEVICES

Types of materials – Conductor, semiconductor, insulator
DIODES: Working principle and characteristics of PN junction diode – Zener diode – Varactor diode – its specification.
TRANSISTOR: Working principle and characteristics of BJT- FET-UJT - types and specification.
POWER ELECTRONIC DEVICES: Working principle and characteristics of SCR- DIAC-TRIAC – IGBT - types and specification.
OPTOELECTRONIC DEVICES: Working principle and characteristics of LDR- LED-Photo Transistor – Photo Diode – Thermister- types and specification.

UNIT V: ELECTRONIC CIRCUITS

RECTIFIER: Construction, working and output waveform of half wave rectifier – Full wave rectifier – Bridge rectifier – its Application.
WAVE SHAPING CIRCUIT: Clipper – clamper – voltage doubler – multivibrator and its types.
REGULATED POWER SUPPLY: Need of RPS – Block diagram of RPS – Transistorized RPS – short circuit protection.

REFERENCE BOOKS:

- Electric Circuit Theory Dr.M.Arumugam Dr.N.Premkumaran Khanna Publishers, New Delhi
- Electrical machines -   K.Bhattacharya, Principal, TTTI, Chandigar Tata McGraw Hill Publishing Company, New Delhi
- A course of Electrical Engineering -B.L.Theraja, S.Chand and Co., New Delhi
- Electronic Devices and Circuits - Salivahanan, N.Sureshkumar and A.Vallavaraj Tata McGraw Hill Publishing Company, New Delhi.
- Electrical Equipment Handbook: Troubleshooting & Maintenance, The Mc Graw-Hill, Company,Inc

SUPERVISE ASSEMBLY LINE ACTIVITIES

Course code	19KUT1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

UNIT I: SUPERVISOR RESPONSIBILITIES
Introduction – Responsibilities to the middle and top management - Responsibilities to the Co workers - Responsibilities to the other supervisor - Responsibilities to the staff – Responsibilities in Labor matter.

UNIT II: SUPERVISORY SKILLS
Communication with others – planning process – Technical competence – Team work and sharing of Knowledge – Training and development of workers – maintain workers discipline and productivity – Department administration – duty routine activities.

UNIT III: HANDLING ELECTRONIC ASSEMBLIES
EOS/ESD PREVENTION: Electrical Overstress (EOS) – Electrostatic Discharge (ESD) – Working cables – Protective materials – EOS/ESD safe workstation.
HANDLING CONSIDERATION: Guidelines – physical damage – contamination – Electronic Assemblies- After soldering – gloves & finger cots.

UNIT IV: ELECTRICAL SAFETY
Theory of Electricity – Hazards of Electricity – Effects of Electricity on Human body – common workplace circuits – Electrical protective devices – Grounding.

UNIT V: TIME MANAGEMENT
Introduction – Goal setting – tools for prioritization –managing interruptions – managing procrastination – scheduling.

REFERENCE:
- Training manual on supervisory skills – WOPAC training and service center, cebu, Phillipines
- Production and Operations Management – Pannerselvam, PHI
- Acceptability of. Assemblies – developed by IPC (IPC-A-610D)
- Successful Time management – www.bookboon.com

LINEAR INTEGRATED CIRCUITS

Course code	18KUT2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

UNIT I: OPERATIONAL AMPLIFIER
Introduction to Op-amp (IC 741) – Schematic symbol for opamp – pin diagram of IC 741 – Block diagram of an opamp – Characteristics of an Ideal opamp - Simple Equivalent circuit of an opamp –op amp parameters – CMRR –Slew rate - virtual ground.

UNIT II: OPAMP APPLICATIONS
Inverting Amplifier, Non Inverting amplifier – Differential Amplifier – scale changer as a Multiplier and Divider - Summing amplifier (Simple problems)- Voltage follower - comparator - zero crossing detector - Integrator – Differentiator – Voltage to current converter – current to voltage converter –Instrumentation amplifier.

UNIT III: DIGITAL TO ANALOG CONVERTER
Basics of D/A conversion – weighted Resistor D/A Converter – R-2R Ladder D/A Converter –Specifications of DAC-Accuracy, Resolution, Monotonocity, Settling time.

UNIT IV: ANALOG TO DIGITAL CONVERTER
Basics of A/D conversion – sampling –Sample and hold circuit –quantization – Types of A/D converter – Block diagram of Flash, Successive approximation, Ramp, Dual Slope ADC – Specifications of ADC – Accuracy, Resolution, conversion time –Functional Block diagram of IC ADC 0808.

Unit V: IC555 TIMER, IC VOLTAGE REGULATORS AND THEIR APPLICATIONS.
IC 555 Timer: Pin diagram of IC 555 – Functional Block diagram of IC555 – Applications – Astable multivibrator – monostable multivibrator – Schmitt trigger – sequence Timer
IC voltage regulators: Linear fixed voltage regulator - Positive voltage regulator using IC 78xx, negative voltage regulator using IC 79xx – Adjustable voltage Regulator LM 317.
General purpose regulator using LM 723 – Pin diagram of LM 723- Low voltage and High voltage regulator using LM 723.

REFERENCE:
- Linear Integrated circuits – D.Roy choudhury & Shail.B. Jain – New age Int. Publishers – II Edition
- "Integrated circuits" – K.R. Botkar – Khanna Pulbisher's – 1996

DIGITAL ELECTRONICS

Course code	18KUT3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

UNIT I : NUMBER SYSTEMS AND CODES

Number systems: Types - Decimal – Binary – Octal – Hexadecimal – BCD – Conversion from one number system to other.

Binary Arithmetic: Binary addition- Subtraction- 1's complement and 2's complement – Signed binary numbers- Binary addition and subtraction using1's complement and 2's complement- 9's complement and 10's complement.

CODES: Types- Binary codes, Excess 3 code, Gray code – conversion from one code to another code.

UNIT II: BOOLEAN ALGEBRA AND LOGIC GATES

Logic gates: Positive and Negative logic System - Definition, Truth table, Symbol and Logical equations of AND – OR - NOT – EXOR - EXNOR (Only 2-inputs) gates –Universal gates - NAND - NOR – Symbol and truth table .

Boolean Algebra : Basic laws of Boolean algebra – Demorgan's Theorem and proofs – Duality theorem - Simplification of logical equations using Boolean laws - De-Morgan's theorem – Four variable Karnaugh map

UNIT III: COMBINATIONAL LOGIC CIRCUITS

Half Adder and full adder- Truth table, Logic diagram – Half subtractor and Full subtractor - Truth table, Logic diagram Parity bit – Use of a parity bit – Odd parity and Even parity

Multiplexer - De multiplexer – Encoder – Decoder (Definition and Basic Circuits only) – Comparator Circuit for two three bit words.

UNIT IV: SEQUENTIAL LOGIC CIRCUITS

Flip flops: Basic principle of operation - S-R, D flip-flop – Operation and truth table - Race Condition – JK flip flop – T flip flop – Toggling - Edge Triggered Flip-flop –J-K Master Slave flip flop.

Counters: Asynchronous counter - 4 bit Asynchronous Counter – Mod N Counter - Decade counter - Synchronous counter - 4 bit Synchronous binary counter – Up and Down Counter - Applications of Counters

UNIT V: REGISTERS AND DIGITAL MEMORIES

Shift register - Block diagram representation and waveforms of Serial – in Serial - out, Serial – in Parallel – out, Parallel-in Serial – out, Parallel - in Parallel – out – Applications of Shift Registers.

MEMORIES – Classification of Semiconductor memories- Static Memory – Dynamic Memory – Static Memory organization in terms of address lines, control lines and data lines – Expanding memory (say 8k to 16k) – SDRAM – DDR RAM.

REFERENCE:
- R.P. Jain – Modern Digital Electronics – TMH 2003.
- Albert Paul Malvino and Donald P. Leach – Digital Principles and applications –TMH – 1991.

PRODUCTION PLANNING AND CONTROL

Course code	18KUT3C05	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

UNIT I: PRODUCTION AND OPERATION MANAGEMENT
Introduction – Production system – objective of Production Management – Operating system – Objectives of operation management – Managing Global operations – Scope of production and Operation management.

UNIT II: PRODUCTION PLANNING
Introduction – need and objectives of PPC – Phases of PPC – Functions of PPC – Operation planning and scheduling systems – Aggregate planning – Master Production Schedule (MPS) – Material Requirement Planning (MRP) – Capacity planning – Routing – Scheduling – Scheduling Methodology.

UNIT III: MAN POWER PLANNING
Introduction- Meaning of man power planning-Importance of man power planning- Need of man power planning-Process of policy formulation-Responsibility of manpower planning- Job Analysis

UNIT IV: PURCHASING MANAGEMENT
Introduction – Procurement process –purchasing organization – sourcing – strategies – purchasing portfolio models – supplier segmentation – supplier selection with focus on choice of evaluation criteria – supplier selection using ISO standards – Supplier development with quality focus.

UNIT V: MAINTENANCE AND INVENTORY CONTROL
Introduction – objectives – types of maintenance – maintenance planning - Maintenance Scheduling – Maintenance schedule techniques – Total Productive Maintenance.
Meaning of Inventory – Reasons for keeping inventory – meaning & objectives of inventory control – Benefits and techniques of inventory control – inventory model.

REFERENCE:
- Production and Operations Management – Pannerselvam, PHI
- Production and Operation management – S.Anil Kumar & N.Suresh – New Age International Publication.
- P.C. Tripathi, Personal Management and Industrial Relations, Sultan Chand & Sons, New Delhi, 1978 (Reprint – 2004).
- Ebook for production and operation management – www.todaylibrary.com
- Purchasing management – Lars Bedes, Sofia Eklund, Nojan Najafi- CHALMERS-Department of Technology Management and Economics

TECHNICAL DRAWING

Course code	18KUG4AL4	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

Unit I - Geometrical construction

Triangle (Equilateral triangle, Right angle triangle, Isosceles triangle, Acute triangle) -Rectangle, Rhombus, Trapezium, Circles -Regular Polygons (Square, Pentagon, Hexagon, Heptagon, Octagon)-Parabola (Tangent method, Offset method)-Ellipse (Parallelogram method, Four centre method, Concentric circles method)-Hyperbola-Cycloids -Involutes -Helix -Spiral curves.

Unit II-Projections

Orthographic (first angle and third angle) (10 simple exercises each) - Isometric (5 simple exercises) - Oblique (2D and 3D wire frame models)   (3 simple exercises) - Blue print reading (Missing views - Missing Lines - Missing dimensions)

Unit III- Sectional View

 Types of sectional view (Full section, Half section, Aligned section, Offset Section, Revolved Section, Removed section) - Detailing view.

Unit IV -Electrical and Electronics Symbols

 Symbols of – DC armatures – alternators – field winding shunt, series and compound – relays – contactors – fuses – main switch – electric bell – earth – aerial – DPST – DPDT – TPST – Network link – ammeters – voltmeters – wattmeter – energy meters – frequency meters – power factor meters – timers – buzzers – transformers – auto transformers- Incandescent lamp-Fluorescent Lamp -Signal lamp- Push button- Fire alarm – Siren- Water Heater- Ceiling Fan-Exhaust Fan - Resistors – inductors – capacitors - diodes – transistors – FET – SCR – UJT – DIAC – TRIAC – MOSFET'S - LOGIC GATES – AND – OR – NOT – NAND – NOR – EXOR

Unit V- Introduction to AutoCAD

History of AutoCAD-Applications- Advantages over manual drafting - hardware requirements – software requirements – window desktop – AutoCAD screen interface – menus – toolbars - How to start AutoCAD – command groups – How to execute command – types of coordinate systems – absolute-relative-polar- Simple sketches (lines and curves)

Text Books:

1) Gopalakrishnan K.R., "Engineering Drawing" (Vol I & II combined), Subhas stores, Bangalore -2007
2) Shah M.B., and Rana.B.C., " Engineering Drawing", Pearson, 2nd edition, 2009.

PRINCIPLES OF MANAGEMENT

Course code	18KUG4EL1	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	IV

UNIT I: INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

Definition of Management – Science or Art – Manager – managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises –Current trends and issues in Management.

UNITII: PLANNING

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning Tools and Techniques – Decision making steps and process.

UNIT III: ORGANISING

Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management.

UNIT IV: DIRECTING

Meaning, Principles and Functions- Motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V: CONTROLLING

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – direct and preventive control – reporting.

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, " Management", Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

PROGRAMMABLE LOGIC CONTROLLER

Course code	19KUT4C06	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

UNIT I: INTRODUCTION TO PLC
Definition – Requirements of PLC – Advantages over relay logic – Block diagram – parts – operation – description & connectivity – communication – memory – PLC scanning – I/O interfacing.

UNIT II: PLC PROGRAMMING
Hand held programming terminals pcs & PLC programming – industrial computer – 1EC 1131 Programming standards – ladder diagram (LD) – functional block diagram (FBD) – instructional list structural text (ST) – sequential functional chart.

 Conventional wiring diagram versus PLC ladder logic – logic fuctions – AND logic, OR logic two input & three inputs with truth table – not logic exclusive OR logic combinational logic – priority logic elements.

UNIT III: PLC INSTRUCTIONS – I
Normally open (or) Examine ON – Normally closed (or) Examine OFF – one shot instruction – Latch output coil unlatch coil

ON delay timer instruction (TON) – OFF delay timer instruction (TOFF) – Retentive timer instruction (RTO) – Counter up instruction (CTU) – Counter down instruction (CTU) – Reset instruction (RES)

UNIT IV: PLC INSTRUCTIONS – II
Equal (EQU) – Not equal (NEQ) – Less than (LES) – Less than or equal (LEQ) – Greater than (GRT) – Greater than or equal (GEQ) – Masked comparison for equal (MEQ) – Limit test (LIM)
Add (ADD) – Subtract (SUB) – Multiply (MUL) – Divide (DIV) – Clear (CLR) – Square root (SQR) -AND – OR – EX-OR – NOT

UNIT V: APPLICATIONS OF PLC
Ladder logic diagram for DOL starter – star/Delta Starter – fluid filling operation – traffic light control –two speed motor control circuit using ladder logic – Automatic rotor resistance starter control using ladder logic.

REFERENCE:

Introduction to Programmable Logic Controller	-	Gary Dunning, Delmar Publications
Sensors and Communication	-	Jon Sterner son
Programmable Logic Controllers	-	Peteruzella
Programmable Logic Controllers	-	George L Batter, Mc-Graw Hill
Programmable Logic Controllers	-	Colin D Simpson, Prentice Hall

TOTAL QUALITY MANAGEMENT

Course code	18KUG5EL2	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

Unit - I   INTRODUCTION

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, and Customer retention - Costs of quality.

Unit - II   TQM PRINCIPLES

Leadership- Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDSA cycle, 5s, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

Unit - III   TQM TOOLS & TECHNIQUES I

The seven traditional tools of quality - New management tools - Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT

Unit - IV   TQM TOOLS & TECHNIQUES II

Control Charts - Process Capability - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

Unit - V   QUALITY SYSTEMS

Need for ISO 9000 - ISO 9001:2015, ISO 29990:2010 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

TEXT BOOK

1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).

2. Janakiraman,B and Gopal, R.K, "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. L

MICROPROCESSOR AND MICROCONTROLLER

Course code	18KUT5C07	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

UNIT I: 8085 MICROPROCESSOR

Introduction – terms related to microprocessor – Architecture of 8085 Microprocessor Pin-out diagram of 8085 – features – of 8085 Instruction formats – Addressing mode – instruction set – Different types of instructions.

UNIT II: 8051 MICROCONTROLLER

8051 Architecture – Introduction – The 8051 Oscillator and Clock –Program Counter and Data Pointer –CPU Registers – PSW – Memory Organization – Stack – Special Function Registers –– Timers – Serial Data – Input / Output – Interrupts Structure – Timer Flag Interrupt – External Interrupt – Reset – Interrupt Control – Interrupt Priority – Interrupt Destinations –Pin Configuration of 8051 and their functions.

UNIT III: INSTRUCTIONS I

Addressing modes – Immediate Addressing modes, Register addressing modes, direct addressing modes, indirect addressing modes - Data transfer instructions – Push and Pop Opcode - Logical operations – SFR Bit addresses. Bit level Boolean operations - Rotate and Swap operations.

UNIT IV: INSTRUCTIONS II

Arithmetic instructions flags – Addition - unsigned and signed addition – Subtraction - unsigned and signed subtraction – Multiplication - Division – Detailed Arithmetic – Jump and Call Instructions – Interrupts and Returns

UNIT V: INTERFACING APPLICATIONS

Introduction – interfacing 8051 with 8255 – ADC/DAC interfacing – simple keypad interface – seven segment LED display interfacing – LCD display interfacing – interfacing sensors – interfacing of stepper motor – DC motor interfacing – interfacing traffic light controller

REFERENCE:
1. Microprocessor and Microcontroller - R. Theagarajan SciTech Publication.
2. Microprocessors and Microcontrollers - M.Senthil Kumar, M.Saravanan, S.Jeevananthan
3. *8051 Architecture and Programming - Kenneth Ayala*

DEVELOP HARDWARE PRODUCT FOR MANUFACTURING

Course code	18KUT5C08	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	V

UNIT I: MATERIAL REQUIREMENT AND SUPPLIER SELECTION
Introduction – material requirement planning and control – techniques of material planning – purchasing – objective and parameters of purchasing – purchasing procedure – selection of suppliers – special purchasing systems.

UNIT II: CAPACITY , FACILITY, PROCESS PLANNING AND WORK STUDY
Capacity planning – importance – capacity measurement – planning process for manufacturing and service industry
Facility planning – location facilities – location flexibility – facility design process and techniques – locational break even analysis
Process planning – procedure – characteristics of production process systems – process from selection with PLC
Work study – significance – methods, evolution of normal/standard time – job design and rating

UNIT III: ELECTRONIC TESTING EQUIPMENTS
Multimeters – Oscilloscope – Digital Oscilloscope – Logic Analyser – Signature analyser – Signal generators – universal bridges – power supplies

UNIT IV: FUNDAMENTALS OF TROUBLESHOOTING PROCEDURES
Making of an Electronic Equipments – Reading drawings and diagrams – Equipment failures – Causes of Equipment failures – Nature of faults – Fault finding aids – Troubleshooting techniques – Approaching components for test – Grounding systems in Electronic equipment – Temperature- sensitive intermittent problems – Corrective actions.

UNIT V: QUALITY CONTROL AND WASTE MANAGEMENT IN INDUSTRY
Types of Quality control – steps in Quality control – objectives and benefits of Quality control – Seven steps for Quality control – causes of variation in Quality control – Statistical process control – Quality circle – TQM
Pollution control – Polluting agents – E-Waste management - Recycling of water – Recovery techniques – Air pollution – Environmental standards – Safety precautions for the personnel.

REFERENCE:
- Ebook for production and operation management – www.todaylibrary.com
- Production and Operation management – S.Anil Kumar & N.Suresh – New Age International Publication.
- PCB design , Fabrication, Assembly & Testing – Dr. Khandpur- Tata Mc Graw Hill

PROFESSIONAL ETHICS AND HUMAN VALUES

Course code	18KUG6EL4	Credits	4	Year	III
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	VI

Unit I: Business Ethics

Conceptual approach – Emerging issues – Importance of Ethics – Understanding Ethics – Ethical decision making – Moral problem

Unit II: Managing Ethical Organization

Elements of ethical organization – Manager's role in influencing ethical climate - Codes of ethics – Codes of Contact – Ethical leadership – Ethical organization

Unit III: Business ethics in Profession

Ethical concern in Human Resource Management (HRM) – Ethical issue in marketing and advertising – Marketing ethics – Ethics in production management – work ethics

Unit IV: Corporate Governance and social responsibility:

Corporate Governance – Company management – Factors for success – Social responsibility towards stakeholders – Social responsibility of business

Unit V: Human Values

Wisdom Management – A person of character – Knowledge Management – Understanding success – Stress management

Text Book:

Business Ethics and Global Values by S.K Bhatia, Deep & Deep Publication Pvt. Ltd., New Delhi

SAFETY ENGINEERING

Course code	18KUG6EL5	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Unit-I   Introduction

Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee- budgeting for safety - Risk assessment & management - Safety Education and training- Importance, various training methods – First Aid, Resuscitation, Bleeding, management of shock, Burns, scalds and accidents caused by electricity, Rescue and transport of casualty Role of management and role of Govt. in industrial safety, safety analysis.

Unit-II   Safety prevention

Definitions and theories, Accident, Injury, unsafe condition, Dangerous occurrence- Cost of accidents- Accident prevention- Safety performance - Personal protective equipment- survey the plant for locations and hazards, part of body to be protected - Economic importance of accidents, Analysis of accident records, accident investigations.

Unit-III   Safety in Material Handling

General safety rules, principles, maintenance, Inspections of turning machines, boring machines, milling machine, planning machine and grinding machines, CNC machines, electrical guards, work area, material handling, inspection - Heat treatment operations, paint shops, sand and shot blasting, safety in inspection and testing, pressure vessels, air leak test, steam testing, safety in radiography, personal monitoring devices, radiation hazards.

Unit-IV   Shopfloor Safety

Automotive vehicle design, selection, operation and maintenance of motor vehicle - Basic automotive road Signals, Symbols, Rules and Regulation - safety on manual, mechanical handling equipment operations - Servicing and maintenance equipment grease rack operation wash rack operation - battery charging - gasoline handling - other safe practices - preventive maintenance - check lists - motor vehicle insurance and surveys.

Unit-V   Electrical Safety

General principles of electric safety - Preventive maintenance - Electricity & Human body - Earthing / Grounding - Safety against over voltage, extra-low and residual voltages - Hazardous areas, Electrical insulation - Energy leakage - Electrical fires and Arc flash - Electrical causes of fire and explosion - National electrical Safety code - Safety in the use of portable tools.

Text Books:

1. C.Ray Asfahl , *Industrial Safety and Health management,* Pearson Prentice Hall,2003.

2. N.V Krishnan. *Safety Management in Industry* Jaico Publishing House, Bombay, 1997.

ENTREPRENEURSHIP DEVELOPMENT

Course code	18KUG6EL6	Credits	04	Year	III
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	VI

Unit I: Entrepreneurship

Meaning, Definition, Characteristics and Functions-Role of Entrepreneur in economic development -Types-Qualities of an Entrepreneurs - Classification of Entrepreneurs-Factors Influencing Entrepreneurship – Entrepreneurship development programme – Self Employment schemes – Government policies on Entrepreneurial development.

Unit II: Institutional Finance to Entrepreneurs

State Level Financial Institutions: State Financial Corporation (SFCS) - State Industrial Development Corporation (SIDCS) – Tamilnadu Industrial Investment Corporation (TIIC) - Small Industries Promotion Corporation of Tamilnadu (SIPCOT).

All Indian Financial Institutions:

Industrial Development Bank of India (IDBI) – Industrial Finance Corporation of India (IFCI) – Industrial Credit Investment Corporation of India (ICICI) – Industrial Rural Development Bank of India (IRDBI).

Unit III: Institutional Setup to Entrepreneurs

District Industries Centre (DIC) – National Small Industries Corporation (NSIC) – Small Industries Development Corporation (SIDC) – Small Industries Service Institute (SISI) – Indian Investment Centre – Kadhi and Village Industries (KVIC).

Unit IV: Incentives and Subsidies of State and Central Government

Subsidy For Market – Capital Assistance - Subsidized Services – Taxations, Benefits to SSI – Transport Subsidy – Seed Capital Assistance – Special Facilities for imports.

Unit V: Sources of Ideas

Preliminary Evaluation and Testing of ideas – Demand based industries and Resource based industries - Project Formulation - Project Identification-Evaluation-Feasibility Analysis-Project Report.

Text Books:

1. Radha V, Entrepreneurship Development, Prasanna Publication House, 2008.
2. Khaka SS, Entrepreneurship Development, S. Chand & Co. Ltd. 2010.
3. Vasant Desai. The Dynamics of Entrepreneurship Development and Management.
4. Gupta C. B, Srinivasan N.P. Entrepreneurship Development, S. Chand & Co. Ltd. 2011.