



**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)
Automobiles**

**SYLLABUS
(ACADEMIC YEAR 2016-2017 Onwards)**

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

For Students admitted from 2016-2017 & onwards

COURSE OF STUDY

- Syllabus is framed for B.VOC (Automobiles) 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.

Automobile Technology-I

Course code	16KUAT101	Credits	4	Year	I
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	I

UNIT - I

Types of four wheeled Automobiles - Vehicle Construction - Chassis - Frame and Body - Aerodynamics. Engine components - Functions and Materials - Cooling and Lubrication Systems in Engine.

UNIT - II

Carburetor - working principle. Construction, Operation of Lead Acid Battery - Electrical systems - generator - Starting Motor and Drives - Lighting and Ignition (Battery, Magneto Coil and Electronic Type)-Regulators-cut outs.

UNIT - III

Clutch - Types and Construction - Gear Boxes, Manual and Automatic - Simple Floor Mounted Shift Mechanism - Over Drives - Transfer Box- Propeller shaft - Slip Joint - Universal Joints - Differential and Rear Axle - Hotchkiss Drive and Torque Tube Drive.

UNIT - IV

Wheels and Tyres - Wheel Alignment Parameters - Steering Geometry and Types of steering gear box- Power Steering - Types of Front Axle - Suspension systems - Braking Systems - Types and Construction

UNIT - V

Brake adjustment, Wheel bearing adjustments, Steering adjustment, clutch pedal adjustment, Wheel balancing, Tyre maintenance and preventive maintenance of some of the 4 wheelers.

Text Book:

Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.

Automobile repair and maintenance I

Course code	16KUAT102	Credits	4	Year	I
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	I

UNIT - I

Engine: Types - Working principle of each - Major components - Petrol supply system and its components - Carburetor - Petrol pump and injectors of MPFI engine - Various sensors and its uses - **Diagnosing troubles in petrol supply system.**

UNIT - II

Diesel supply system and its components - Individual injection system - CRDI - Diesel pump - Injectors - Filters - Types of combustion chambers - Air supply system - Air cleaners - Exhaust and emission system - Silencers (Mufflers) - Catalytic convertor - **Diagnosing troubles in diesel supply system.**

UNIT - III

Cooling system and its components - Coolants used - Antifreeze solution - Types of cooling systems - Lubrication system and its components - Types of lubrication systems - Types of lubricants - Properties and SAE grade of lubricating oils - Electronics ignition system - Types and its components- **Diagnosis of troubles in cooling system, lubricating system and ignition system.**

UNIT - IV

Clutch - Types - Function - Fluid flywheel - Torque convertor - Hydraulic assisted clutch - Clutch adjustments - Gear box - Types - Functions - Constant mesh gear box - Synchromesh gear box - Manual and automatic gear boxes - Planetary gears. Transfer box - Trans axle arrangement - Propeller shaft and universal joints - Rear axle and differential - Final drives - **Diagnosing troubles in clutch, gear box and rear axles.**

UNIT - V

Steering system - Types - Components - Rack and pinion, Worm and sector and re-circulating ball and nut steering gear boxes - Electronics control of steering system - Wheel alignments. Suspension systems - Conventional suspension - Independent suspension system for front and rear wheels - Types of springs and shock absorbers - Stability control - Air suspension with electronic control - **Diagnosing troubles in steering system and suspension system.**

UNIT - VI

Brakes - Function - Types - Hydraulic brake system - Master cylinder, Tandem master cylinder - Wheel cylinder - Vacuum assisted hydraulic brake - Air assisted hydraulic brake - Brake bleeding - Brake fluids - Disc brake - Types of calipers - Friction pads - Advantages over drum brake - Air brake system and its components - Advantages - ABS brake system - Modulator / Actuator, ECU / ECM & HCU - ABS with traction control. Wheels - Types -

Tyres and its types - Construction - Wear pattern - Inflation pressure - Tyre mark - Vulcanizing - Air and hydrogen inflation in tyres- Diagnosing troubles in brakes and wheel.

Text Book:

1. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.

Automotive Electrical and Electronics-I

Course code	16KUAT203	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

UNIT - I

Ohm's law, voltage, power, current (AC/DC), resistance, magnetism and electromagnetic induction, vehicle earthing - Electrical symbols - electrical safety procedures - Wiring and lighting circuits and their components - Battery: Construction, Operation, charging and testing methods - Voltage and oscilloscope patterns - Digital and fiber optics principles, logic families, radio frequency, discrete electronic components - Signaling, driven information and control devices.

UNIT - II

Charging system and its components - Starting system and its components - Types of starter motors and its drives - Electronic ignition system and its components - Spark plug, CD ignition, distributor less ignition - Diagnose troubles in starting system - Carry out various tests on starter motor - Servicing of starter motor - Diagnose troubles in charging system - Carry out various tests in charging system - Servicing of alternator.

UNIT - III

Electronic stability systems - Vehicle dynamic control - Closed loop electronic steering. Electric overhauling systems: Garbage comparators - Crane rams - Steering control - Accelerator bucket control - steering rudder control. Engine management systems: Fuel cell technology / hydrogen - online maintenance and remote diagnostics - CRDI injection - Drive by wire - Closed loop diesel engine management systems.

UNIT - IV

Electrical / Electronic control of: Torque convertors, automatic transmission - Mechatronic modules. Braking systems: ABS, Engine brake, Electric retarders, Electric trailer brakes, Brake by wires. Safety systems : Fire suppressing, work load detecting, tyre pressure control, speed load limiting, traction control, seat belt pre-tensioning, roll over protection, object detection, navigation aids, intelligent transport systems, adaptive cruise control, active and passive collision avoidance, infrared vision, lighting and windscreen wipers control.

UNIT - V

Monitoring / protecting systems: LCD, VFT, CRT, HUD, re-configurable systems, electronic analogue display, onboard diagnostics, remote / wireless monitoring systems. Convenience and entertainment systems - Audio and visual units, Compact discs, Analogue tapes, Radio, Speaker types, Amplifiers, Crossovers, Balancers, Ariels, etc.,

UNIT - VI

Anti-theft systems : Remote keyless entry (RKE), Immobilizer system design, Passive entry systems, Two way RKE, Finger print technologies, Rolling codes, Transmitter and receiver operations, Satellite systems. Electric and hybrid vehicle systems: Battery technology -

Motor drive systems - **Motor controllers** - Air conditioning system - Electronic protection systems.

UNIT - VII

Climate control systems : Air conditioning, heating, blending systems. **Electronic control units and sensors**, actuators, Hydraulic and pneumatic system.

Text Book:

1. Judge. A.W., "Modern Electrical Equipment of Automobiles", Chapman & Hall, London, 1992

Principles of Management

Course code	16KUGE307	Credits	4	Year	II
No. of Lecture Hours	60	No. of Practical Hours	-	Sem	III

OBJECTIVES:

To enable the students to study the evolution of Management, to study the functions and principles of management and to **learn the application of the principles in an organization.**

UNIT I: INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

Definition of Management - Science or Art - Manager Vs Entrepreneur - types of managers - 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 - **Organization culture and Environment** - Current trends and issues in Management.

UNITII: PLANNING

Nature and purpose of planning - planning process - types of planning - objectives - setting objectives - policies - Planning premises - Strategic Management - Planning Tools and Techniques - **Decision making steps and process.**

UNIT III: ORGANISING

Nature and purpose - **Formal and informal organization** - organization chart - organization structure - types - Line and staff authority - departmentalization - delegation of authority - centralization and decentralization - Job Design - Human Resource Management - HR Planning, Recruitment, selection, Training and Development, Performance Management, Career planning and management.

UNIT IV: DIRECTING

Foundations of individual and group behavior - 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** - control and performance - 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.

Automobile Technology II

Course code	16KUAT304	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

Unit - I

Introduction to Automotive Technology: Introduction, Light commercial vehicle, Medium & Heavy Commercial vehicle, Major parts of Automobiles, Body, Body Types, Chassis, classification of Chassis with respect to fitting of Engines, chassis repair.

Unit - II

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

Unit - III

Measuring systems and measuring tools, shop hand tools, special tools used for denting, safety standards for vehicles, accidental repair, Importance of maintenance. Scheduled and unscheduled maintenance. Preparation of check lists. Chassis lubrication. Cost effectiveness. Pre-trip. Inspection forms. Log books. Trip sheets. Other maintenance record forms.

Unit-IV

Emission norms - EURO, USA, JAPAN and INDIA. Controlling of pollutants from engine - catalytic converters - charcoal canister control for evaporative emission - positive crank case ventilation system for unburnt hydrocarbon emission reduction - Fumigation EGR (Exhaust gas recirculation) - Air injection - silencer design on sound reduction in automobiles. - Exhaust gas analyser - Smoke meter. Chemistry of engine combustion - HC and CO formation in engines - NO formation in engines - Smoke emissions from SI engines - Effect of operating variables on emission formation

Unit-V

Air assisted Combustion, Homogeneous charge compression ignition engines - Alcohol, Hydrogen, Compressed Natural Gas, Liquefied Petroleum Gas and Bio Diesel - Properties, Suitability, Merits and Demerits - Engine Modifications.

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Textbook:

1. Ramalingam. K.K., "Internal Combustion Engine Fundamentals", Scitech Publications, 2002.

Automobile repair and maintenance-II

Course code	16KUAT305	Credits	05	Year	II
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	III

Unit-I

Maintenance - Need, importance, primary and secondary functions, policies - classification of maintenance work - vehicle insurance - basic problem diagnosis. **Automotive service procedures - workshop operations** - workshop manual - vehicle identification - Safety - Personnel, machines and equipment, vehicles, fire safety - First aid. Basic tools - special service tools - measuring instruments - condition checking of seals, gaskets and sealants. **Scheduled maintenance services** - service intervals - Towing and recovering.

Unit-II

Basic construction of chassis - Types of Chassis layout - with reference to Power Plant location and drive - various types of frames, Loads acting on vehicle frame - Types of Front Axles and Stub Axles - Front Wheel Geometry - Condition for True Rolling Motion - Driving Thrust and its effects, torque reactions and side thrust, Hotchkiss drive, torque tube drive, radius rods and stabilizers, Propeller Shaft, Universal Joints, Constant Velocity Universal Joints, Final drive, different types of final drive, Worm and Worm wheel, straight bevel gear, spiral bevel gear and hypoid gear final drive. Differential principle - Constructional details of differential unit, Differential housings and Non-Slip differential, differential locks.

Unit-III

Dismantling of engine components and cleaning - cleaning methods - visual and dimensional inspections - minor and major reconditioning of various components (like engines and fuel system, ignition systems, suspension system, Braking System, etc), reconditioning methods - engine assembly - engine tune up.- special tools used for maintenance and overhauling - Mechanical and automotive clutch and gear box servicing and maintenance and servicing of propeller shaft and differential system - Maintenance and servicing of suspension systems - Brake systems, types and servicing techniques. Steering systems - **overhauling and maintenance. - Wheel alignment - , computerized alignment and wheel balancing.**

Unit-IV

Servicing and maintenance of fuel system of different types of vehicles - calibration and tuning of engine for optimum fuel supply - Maintenance of cooling systems and its components - water pump, radiator, thermostat - anticorrosion and antifreeze additives. Lubrication maintenance - lubricating oil changing - greasing of parts.

Vehicle body maintenance - minor and major repairs - Door locks and window glass actuating system maintenance.

Unit-V

Batteries and power storage system, power-generating systems - electrical wire harness - lighting, ignition - electronic and air conditioning systems etc - energy recuperation systems - electronic active and passive safety - comfort and convenience supplementary restraint systems (SRS) - networking and other systems - electronic control unit - ECU / ECM and sensors - Diagnosing troubles in Electrical and Electronics equipments.

Text Books:

1. R.Sounddaraa Rajan, "Automobile Maintenance", R.P.Publication.
2. Tim Gills, "Automotive Service: Inspection, Maintenance, Repairing", Cengage Learning, 2004

Technical Drawing

Course code	16KUGE408	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

Objectives:

At the end of the semester the student must be able to draw

- 2D diagrams using Auto CAD
- Symbols widely used in Electrical and Electronics circuits

Unit I- 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.

Unit II -Text and Dimensioning

Auto CAD importance, Auto CAD Tools, Drafting and Unit settings, Auto CAD commands, Types of Lines and Layers -Simple Sketches (lines and curves)

Single text and multi text- Basic dimensioning - editing dimensions - dimensions styles - dimensioning systems variables.

Unit III - Geometrical construction

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

Unit IV-Projections

Orthographic (first angle and third angle) (10 simple exercises each) - **Isometric** (5 simple exercises)- (Different types of machine parts- 2D and 3D wire frame models- Solid figures) - Oblique (2D and 3D wire frame models) (3 simple exercises) - Blue print reading (Missing views - Missing Lines - Missing dimensions)

Unit V -Electrical and Electronics Symbols

Draw 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.

Draw symbols of Resistors - inductors - capacitors - diodes - transistors - FET - SCR - UJT - DIAC - TRIAC - MOSFET'S - LOGIC GATES - AND - OR - NOT - NAND - NOR - EXOR

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.

Professional Ethics and Human Values

Course code	16KUGE409	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

Objectives:

- Understand what morality is and how it connects to professional ethics
- Understand the features of moral reasoning, moral explanations and the role of moral theories
- Develop a case resolution model for resolving moral dilemmas faced by professionals

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:

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

Automotive electrical and Electronics II

Course code	16KUAT406	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

Unit-I

Ohm's law, voltage, power, current (AC/DC), resistance, magnetism and electromagnetic induction, vehicle earthing - **Electrical symbols - electrical safety procedures** - Wiring and lighting circuits and their components - Different types of Batteries - principle, rating, testing and charging. Starter motors characteristics, capacity requirements. Drive mechanisms. Starter switches.

Unit-II

Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods - Horn, wiper system and trafficator. DC Generators and Alternators their characteristics. Control unit - cut out, electronic regulators. Spark plugs. Advance mechanisms. Different types of ignition systems. Electronic fuel injection systems, mono and multi point fuel injection system - Basic sensor arrangements. **Types of sensors - Fuel cell Technology and types.**

Unit-III

Current trends in **automotive electronic engine management system**, electro magnetic interference suppression, electromagnetic compatibility, **electronic dashboard instruments, onboard diagnostic system, security and warning system**. Wind screen washers & wipers. Signaling circuits Electric horns, Engine cooling fan motors, Headlight wipers & washers. Electronic speed control.

Unit-IV

Antilock braking system, air bag restraint system, voice warning system, seat belt system, **road navigation system, anti theft system, Smart Cars and Traffic system**, Wi-Fi cars ,blue Tooth ,Applications, Vision Enhancement, Microprocessor and microcomputer controlled devices in automobiles such voice warning system, **travel information system, keyless entry system, automatic transmission system, electronic steering system.**

Unit-V

Maintenance of batteries, starting system, charging system and body electrical -**Fault diagnosis using Scan tools**. Maintenance of air conditioning parts like compressor, condenser, expansion valve, evaporator - Replacement of hoses- Leak detection- AC Charging- Fault diagnosis Vehicle body repair like panel beating, tinkering, soldering, polishing, painting.

Text books:

1. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.
2. Automotive electrical equipments, P.L.Kohli, Tata McGraw hill publications

Total Quality Management

Course code	16KUGE513	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 -Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - 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 - Concepts of Six Sigma - 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.Besterfield, et al., "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

Work shop Supervising and Management

Course code	16KUAT507	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	V

Unit-I **Management Training and Operations**

Basic principles of supervising - Organising time and people - Job instruction training, training for new devices and techniques - Evaluate and allotment of technician - Vehicle operation and types of process - Work scheduling, Overtime, Breakdown analysis, Cost estimation - Vehicle technical specifications of various OEM vehicular products - Relevant and up-to-date knowledge of vehicle design, manufacture, consumer, industry and trade practices - Importance of maintenance, types- preventive (scheduled) and breakdown (unscheduled) maintenance - Safety precautions in maintenance- Knowledge of free and paid service schedules, fault diagnosis, technician notes, job cards, warranty procedures, log sheets and other forms- Evaluate the information gathered from the customer report, customer satisfaction

Unit-II **Engine Maintenance**

Lubrication system - lubricating/ engine oil top up, oil changing, cleaning methods, visual and dimensional inspections, minor/major adjustments of various components - maintenance of engine accessories- air filter, battery, cooling system, electrical wiring in engine compartment. Engine tune up, top overhauling, dismantling of engine - components, cleaning, visual and dimensional inspections, minor/major reconditioning of various components, reconditioning methods, engine assembly - special tools used for maintenance/ overhauling

Unit-III **Maintenance of other Assemblies lubrication system**

lubricating/ gear oil top up, oil changing, cleaning methods - visual and dimensional inspections, minor/major adjustments of various components of transmission system - Servicing and maintenance of clutch, gear box, propeller shaft, differential - Servicing and maintenance of suspension system, brake system, steering system, wheel alignment and wheel balancing

Unit-IV **Electrical System Maintenance**

Checking of electrical components for functioning, checking of battery, electrolyte - top up, terminal cleaning & protection methods, checking of starter motor, checking of charging systems- fan belt tension checking and adjustment - Testing methods for checking of ignitions system, lighting system - fault diagnosis and maintenance of modern electronic controls - checking and servicing of dash board instruments.

UNIT-V **Motor Vehicle Act and Pollution control and Standards**

Motor Vehicle Act: Schedules and sections, Registration of motor vehicles, Licensing of drivers, Control of permit, Limits of speed, traffic signs - Constructional regulations - Description of goods carrier, delivery van, tanker, tipper, Municipal - fire fighting and break down service vehicle.

Pollution: Pollutant formation in Engines, mechanism of HC and CO formation in four stroke and two stroke engines, NOx formation in engines - Engine Design modifications, fuel modification, evaporative emission control - EGR, air injection, thermal reactors, Water Injection, catalytic converters - Application of microprocessor in emission control- Pollution standards, driving cycles - Indian Pollution standards.

Text book:

1. Tim Gills, "Automotive Service: Inspection, Maintenance, Repairing", Cengage Learning, 2004

2. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.

Safety Engineering

Course code	16KUGE615	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	16KUGE616	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 (SFC) - 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 - Kadi 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.