

# **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 (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.

## **PROGRAMME OUTCOMES:**

The Department of Automobiles provides the practical learning environment for the students which aim to meet out the industrial requirements in the field of Automobiles 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 knowledge of vehicle science and automobile fundamentals in the field of competitive automotive field.

**PSO2.** Understand the applications of electrical, electronics and hydraulic devices in the field of Automobile.

**PSO3.** Diagnose the automotive system failures and repair / replace the components / systems so as to bring the vehicle in original condition.

**PSO4.** Ability to work in an industry as a team member as well as an individual with professional qualities and evolve oneself for lifelong learning.

**PSO5.** Ability to lead professionally in an industrial environment by applying managerial and technical skills related to Research and development, production and service activities.

## Basic Automobile Technology

Course code	19KUA1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

### Course Outcomes (CO)

CO1	The main objective of this course is to impart knowledge in automotive vehicle.	K
CO2	The students will understand the constructional, working principle of various sub system of an automotive vehicle.	U & S

K-Knowledge

U- Understand

S-Skill

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

S - Strong; M - Medium; L - Low

### Automotive Electrical and Electronics

Course code	19KUA1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

#### Course Outcomes (CO)

CO1	The students will be able to understand and working of the automotive electrical and electronic system components, possible causes of defects and their repairs.	K,U&S
CO2	Understand the operation of vehicle sensors, actuators and display units.	U & S
CO3	Be able to carry out systematic fault diagnosis and repairs on vehicle electronic system.	U&S

K-Knowledge      U- Understand      S-Skill

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

S - Strong; M - Medium; L - Low

## Automobile Technology and Maintenance

Course code	19KUA2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

### Course Outcomes (CO)

CO1	The student will be able to understand the construction, function and working of individual component and the system in which it functions.	K & U
CO2	The student will also be able to understand the need of maintenance service to prevent or remove the defects that may come up.	K,U &S

K-Knowledge      U- Understand      S-Skill

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

S - Strong; M - Medium; L - Low

### Advanced Automobile Technology

Course code	19KUA3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

#### Course Outcomes (CO)

<b>CO1</b>	The students will understand the recent development pertain to energy system, vehicle operation, newer vehicle, recent technologies in the area of Automobile Engineering.	<b>K,U&amp;S</b>
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K- Knowledge, U - Understand, S - Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	S	S	M	S	S	M	M	L

S - Strong; M - Medium; L - Low

### Automobile Repair and Maintenance

Course code	19KUA3C05	Credits	05	Year	II
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	III

#### Course Outcomes (CO)

<b>CO1</b>	This knowledge will be helpful to the student in understanding maintenance schedules, maintaining records, maintenance of engine, other mechanical and electrical systems beside co-relating various systems with each other and understanding the individual system in a better manner.	<b>K&amp;U</b>
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K-Knowledge      U- Understand      S-Skill

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	L	M	S	M	S	L	M

S - Strong; M - Medium; L - Low

## TECHNICAL DRAWING

Subject code	18KUG4A14	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

### Automotive Safety

Course code	19KUA4C06	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

#### Course Outcomes (CO)

<b>CO1</b>	The student will be familiar in various systems that enhances vehicle safety, passenger comfort, recent technologies in automobile field etc.	<b>U&amp;S</b>
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K-Knowledge      U- Understand      S-Skill

	PSO1	PSO2	PSO3	PSO4	PSO5		PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	S	S	M		S	S	S	M	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

### Workshop Supervising and Management

Course code	18KUA5C07	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	V

#### Course Outcomes (CO)

CO1	Identifying, understanding and working with professional standards.	K&U
CO2	Manage quality issues in the work done by the technicians and components/ aggregate specialists to reduce rework or repeat complaints	K,U&S

K-Knowledge      U- Understand      S-Skill

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

## Basic Automobile Technology

Course code	19KUA1C01	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

### UNIT - I

Constructional details of spark ignition (SI) and compression ignition (CI) engines. Working principles. Two stroke SI and CI engines - construction and working. Comparison of SI and CI engines and four stroke and two stroke engines. Engine classification, firing order. Otto, diesel and dual cycles.

### UNIT - II

Clutch - Types and Construction - Gear Boxes, Manual and Automatic Types and Construction - 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 - III

Requirement of Suspension System, Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi-Leaf spring, Coil and Torsion bar Springs, Rubber, Pneumatic and Hydro - elastic Suspension Spring Systems, Independent Suspension System, Shock Absorbers, Types and Constructional details of Leaf and Coil Springs.

### UNIT - IV

Basic construction of chassis, Types of Chassis layout, with reference to Power Plant location and drive, various, types of frames, Types of Front Axles and Stub Axles. Steering system - Ackerman's and Davi's Steering Mechanisms - principle of steering - front end geometry - castor, camber, king pin inclination, toe-in, toe-out on turns - steering gear box - types - Over Steer and Under Steer and Power Steering.

### UNIT - V

Types and Construction of Hydraulic Braking System, Mechanical Braking System, Pneumatic Braking System, Power-Assisted Braking System, Servo Brakes - antilock braking systems(ABS) - Wheels and Tyres.

### Text Book:

1. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.
2. Ramalingam. K.K., "Internal Combustion Engine Fundamentals", Scitech Publications, 2002.



## Automotive Electrical and Electronics

Course code	19KUA1C02	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	I

### Unit-I

Ohm's law- Kirchoff's Law - voltage, power, current (AC/DC), resistance, Capacitors, 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.

### UNIT-II

Charging system and its components - Starting system and its components - Types of starter motors and its drives - Different Types ignition systems - 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

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. Electronic fuel injection systems, mono and multi point fuel injection system, Air conditioning system

### UNIT-IV

Current trends in automotive electronic engine management system, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system, Fingerprint technologies, Types of sensors, Wind screen washers & wipers, Headlight wipers & washers, Engine cooling fan motors. Electronic speed control

### UNIT-V

Anti theft system, keyless entry system, Immobilizer system design, voice warning system, road navigation 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, Electronic protection system, electronic steering system.

### Text books:

1. Automotive electrical equipments, P.L.Kholi, Tata McGraw hill publications
2. Judge. A.W., "Modern Electrical Equipment of Automobiles", chapman & Hall, London,1992.

## Automobile Technology and Maintenance

Course code	19KUA2C03	Credits	04	Year	I
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	II

### UNIT - I

**Petrol Engine- Working principle** - 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 Engine- Working principle** - Major components - Diesel supply system and its components - Individual injection system - Diesel pump - Injectors - Filters - **CRDI** - Air supply system - Air cleaners - **Diagnosing troubles in diesel supply system.**

### UNIT - III

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

### Text Book:

1. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 1997.
2. R. K. Rajput, "A Text Book of Automobile Engineering". Publisher, Firewall Media, 2007.

## Advanced Automobile Technology

Course code	19KUA3C04	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	III

### Unit - I

Introduction to **alternative fuels**. - Need for alternative fuels - Availability of different alternative fuels for SI and CI engines - Various vegetable oils and their important properties - **Different methods of using vegetable oils engines** - Performance in engines - Performance, Emission and Combustion Characteristics in diesel engines.

### Unit - II

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

### Unit - III

**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-IV

**Emission norms - EURO, USA, JAPAN and INDIA** - Controlling of pollutants from engine - catalytic converters - Char coal canister control for evaporative emission - Positive crank case ventilation system for Un-burnt hydro carbon emission reduction - Fumigation EGR (Exhaust gas recirculation) - Silencer design on sound reduction in automobiles - Exhaust gas analyzer - Smoke meter - Smoke emissions from engines.

### Unit-V

Preparation and maintenance of proper road network - **National highway network with automated roads and vehicles** - **Satellite control of vehicle operation for safe and fast travel, GPS**.

### Textbook:

1. Heinz, "Modern Vehicle Technology" Second Edition, Bu.
2. R. K. Rajput, "A Text Book of Automobile Engineering". Publisher, Firewall Media, 2007.

## Automobile Repair and Maintenance

Course code	19KUA3C05	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

Subject 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 -Involutives -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, 2<sup>nd</sup> edition, 2009.

## PRINCIPLES OF MANAGEMENT

Subject 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.

### UNIT II: **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.

## Automotive Safety

Course code	19KUA4C06	Credits	04	Year	II
No. of Lecture Hours	60	No. of Practical Hours	--	Sem	IV

### Unit I

Introduction to automotive safety, Design of the body for safety, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumple zone, safety sandwich construction

### Unit II

**Active safety:** driving safety, conditional safety, perceptibility safety, operating safety, passive safety: exterior safety, interior safety, deformation behavior of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

### Unit III

**Anti-lock braking system, air bags,** electronic system for activating air bags, Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tillable steering wheel, traction control systems, Roll over mitigation, , bumper design for safety

### Unit IV

**Collision warning system,** causes of rear end collision, adaptive cruise control, frontal object detection, rear vehicle object detection system, **object detection system** with braking system interactions, Reverse sensing system, **Automatic emergency braking.**

### Unit V

Steering and mirror adjustment, central locking system, Automatic parking, Garage door opening system, **tyre pressure control system, speed load limiting, rain sensor system,** lighting and windscreen wipers control, environment information system, **In-car internet.**

### Text Books:

1. Bosch, "Automotive Handbook", 8th Edition, SAE publication, 2011.
2. Powloski. J., "Vehicle Body Engineering", Business books limited, London, 1969.
3. Ronald.K.Jurgen, "Automotive Electronics Handbook", Second Edition, McGraw-Hill Inc., 1999.



## TOTAL QUALITY MANAGEMENT

Subject 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 - PDCA 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. 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	18KUA5C07	Credits	05	Year	III
No. of Lecture Hours	75	No. of Practical Hours	--	Sem	V

### Unit-I

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

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

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

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:** 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, NO<sub>x</sub> 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.

## PROFESSIONAL ETHICS AND HUMAN VALUES

Subject 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

Subject 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

Subject 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.