West Bengal State Council of Technical & Vocational Education and Skill Development
(Technical Education Division)

Syllabus
of

Diploma in Automobile Engineering [AE]

Part-II (3rd Semester)

Revised 2022

Semester-wise Detailed Curriculum

Semester III (Second year)

Branch/Course: Automobile Engineering

Sl. No.	Category	Code	Course Title	Hours per week			Total contact hours/ week	Credits
				Lecture	Tutorial	Practical		
1	Program Core Course	AEPC 301	Strength of Materials	2	1	0	3	3
2	Program Core Course	AEPC 302	Heat Power Engineering	3	0	0	3	3
3	Program Core Course	AEPC 303	Automotive Materials and Manufacturing Process	3	0	0	3	3
4	Program Core Course	AEPC 304	Automotive Chassis	3	0	0	3	3
5	Program Core Course	AEPC 305	Automotive Engines	3	0	0	3	3
6	Program Core Course	AEPC 306	Heat Power Engineering Lab	0	0	2	2	1
7	Program Core Course	AEPC 307	Automotive Materials and Manufacturing Process Lab	0	0	2	2	1
8	Program Core Course	AEPC 308	Automotive Chassis Lab	0	0	2	2	1
9	Program Core Course	AEPC 309	Automotive Engine Lab	0	0	3	3	1.5
10	Internship - I after IInd Sem	SI 301	Internship	0	0	0	0	1
Total				**14**	**1**	**9**	**24**	**20.5**

Syllabus of Strength of Materials

Course Code	AEPC 301
Course Title	Strength of Materials
Number of Credits and L-T-P	3 [L – 2, T – 1, P - 0]
Course Category	PC
Prerequisites	Engineering Mechanics

Course Objectives:

After completing this course, the students will be able

- To apply the concept of Simple Stresses and Strains in solving related problems.
- To apply the concept of Strain Energy in solving related problems.
- To understand the concept of Shear Force and Bending Moment and apply the concept in drawing SFDs and BMDs to related problems.
- To understand and apply the concept of Theory of Simple Bending and Deflection of Beams.
- To understand the concept of Shear Stress in non-uniform bending.
- To understand and apply the concept of Torsion in Shafts and Springs.
- To understand and apply the concept of Principal stresses at a point in biaxial stress case.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	**Simple Stresses and Strains:** ➢ Types of forces – Gradual/static, impact, suddenly applied; tensile, compressive etc. ➢ Stress (normal, shear, tensile, compressive etc), Strain (both normal and shear) and their nature. ➢ Hooke's law, elastic modulus. Assumptions, applicability, units. ➢ Mechanical properties of common engineering materials – Rigidity, elasticity, plasticity, stiffness, ductility, malleability, hardness, toughness. ➢ Study of stress-strain diagram for M.S. and C.I. specimens; Explanation of yielding, plasticity, ductility and toughness from stress-strain diagram. ➢ Concept and significance of factor of safety and	**10**

	working/allowable stress. ➢ Stress, strain and deflection values in bodies of uniform section and of composite section under the influence of normal forces. ➢ Concept of lateral strain, Poisson's ratio, volumetric strain. ➢ Thermal stresses in bodies of uniform section. ➢ Hoop stress and longitudinal stress in thin cylinder; concept and derivation of formula. Related simple numerical problems. **Strain Energy:** ➢ Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/shock load. ➢ Strain energy or resilience, proof resilience and modulus of resilience. Related simple numerical problems.	
2	**Shear Force & Bending Moment Diagrams:** ➢ Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam. ➢ Types of Loads – Point and distributed; UDL and UVL ➢ Definition and explanation of shear force and bending moment; Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases: a) Cantilever with point loads, b) Cantilever with uniformly distributed load, c) Simply supported beam with point loads, d) Simply supported beam with UDL, e) Over hanging beam with point loads, at the centre and at free ends, f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above; Related numerical problems.	**8**
3	**Theory of Simple Bending and Deflection of Beams:** ➢ Explanation of terms: -Pure bending, Neutral layer, Neutral Axis of both beam and cross-section, Section Modulus, Moment of Resistance, Bending stress, Radius of curvature. ➢ Calculation of Moment of Inertia of simple geometrical	**8**

	sections - both solid and hollow. Moment of inertia of I & T sections. Parallel axis theorem. ➢ Assumptions in theory of simple bending. ➢ Bending Equation M/I = σ/Y = E/R with derivation. Stress distribution diagram. ➢ Problems involving calculations of bending stress, modulus of section and moment of resistance; Calculation of safe loads and safe span and dimensions of cross- section. ➢ Beam sections of interest in automotive application: I-section, Channel section, box section; Properties of these sections that make those suitable for automotive applications and areas of application. ➢ Shear stress in bending: - Rise of shear stress in non-uniform bending. Shear stress equation $\tau = \frac{VQ}{Ib}$; No derivation; Explanation of individual terms. Shear stress variation in rectangular and circular cross section. (No numerical problems from this topic) ➢ Definition and explanation of deflection as applied to beams; Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only) Related numerical problems.	
4	**Torsion in Shafts and Springs:** ➢ Definition and function of shaft. ➢ Calculation of polar M.I. for solid and hollow shafts. ➢ Simple/ pure torsion and assumptions in simple torsion. ➢ Derivation of the equation T/J=τ/R=Gϕ/L; ➢ Problems on design of shaft based on strength and rigidity; ➢ Use of propeller shaft, torsion bar in automobiles. ➢ Numerical Problems related to comparison of strength and weight of solid and hollow shafts; ➢ Classification of springs; Nomenclature of close coiled helical spring. Use of helical springs in automobiles. ➢ Shear stress and deflection formula for closed coil helical spring (without derivation).Stiffness of spring (No composite spring). ➢ Numerical problems on close coiled helical spring to find safe load, deflection, size of coil and number of coils.	**8**

5	**Principal Stress:** ➢ Stresses on an inclined plane. ➢ Complementary shear stress. Naming convention of shear stress. ➢ Ideal case of biaxial/plane stress; Values of normal and shear stresses on an inclined plane in case of biaxial stress. (No derivation – trigonometric expressions only) ➢ Concept of Principal planes, Principal stresses, Maximum shear stress; their values and positions. ➢ Mohr's circle of stress. Derivation of values of σ_1, σ_2 and τ_{max} from Mohr's circle. ➢ Construction of Mohr's circle in the following cases: Uniaxial stress (a rod/bar in pure tension/compression); pure shear (an element on a shaft in pure torsion); equal tension and compression on two perpendicular planes (no shear); mention equivalence of the previous two scenarios; Discuss stress scenarios on elements at various positions of a beam under non-uniform bending – on neutral axis, on two extreme fibres, somewhere in between neutral axis and extreme fibres. ➢ Numerical problems on Principal stress. ➢ Numerical problems on Mohr's circle. ➢ Theories of Failure: - Principal stress theory, Principal strain theory, Shear stress theory; Their applications and limitations.	**8**
	Total Number of Contact Hours	**42**

Weightage distribution in both objective and long answer type questions:

Group Name	Module Number	Weightage (%)
A	1	20
B	2 & 3	40
C	4 & 5	40

Course Outcomes:

At the end of the course, the student will be able to:

CO1	Compute stress and strain values and find the changes in axial dimension of bodies of uniform section under the influence of normal forces.

CO2	Calculate thermal stresses, in bodies of uniform section.
CO3	Define resilience, proof – resilience and modulus of resilience and obtain expressions for instantaneous stress developed in bodies subjected to different loads.
CO4	Compute shear force and bending moment at any section of beam and draw the S.F. & B.M diagrams and calculate the safe load, safe span and dimensions of cross section of beams subjected to UDL and Point loads.
CO5	Compare strength and weight of solid and hollow shaftsof the same length and material subjected to torsionand compute the stress and deflection of the closed coil helical spring.
CO6	Compute maximum/minimum normal and shear stresses in case of biaxial /plane stresses.

Text Books:

1. Strength of Materials – S.S Bhavikatti, Vikas Publishers
2. Strength of Materials – U.C. Jindal, Pearson
3. Strength of Materials – R.S. Khurmi, S.Chand Company Ltd. Delhi
4. A Text Book strength of Material– R.K. Bansal, Laxmi Publication New Delhi
5. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
6. Strength of Materials – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi, 2013

Reference Books:

1. Strength of Materials (SI Edition) – R.C Hibbeler, Pearson
2. Strength of Materials – Stephen Timoshenko, CBS
3. Strength of Materials – R. Subramanian, Oxford

Syllabus of Heat Power Engineering

Course Code	AEPC 302
Course Title	Heat Power Engineering
Number of Credits and L-T-P	3 [L – 3, T – 0, P - 0]
Course Category	PC
Prerequisites	Nil

Course Objectives:

After completing this course, the students will be able

- To know the applications of thermodynamic principles and processes.
- To recognize the working of various Steam Boilers, functions of various accessories and mountings of boilers.
- To differentiate the different air standard cycle and calculate their efficiency
- To realize the working process of air compressor and a compression between signal stage and multi stage air compressor and different types of air compressor.
- To achieve some idea on refrigeration process and air conditioning process.
- To aware regarding different types of heat transfer process and their application

Module No.	Description of Topic	Contact Hrs.
1	**Basic of Engineering Thermodynamics** 1.1. Thermodynamics, System, Surroundings, Universe, 1.2. Types of Systems- closed system, open system, isolated system, flow system, non-flow system, and examples. 1.3. Properties of systems- Extensive and Intensive properties with symbols and units. Thermodynamic state, Path, Process, Quasi-static process, reversible, irreversible, cycle, thermodynamic equilibrium, Point function and path function. 1.4. Pressure- Units, standard atmospheric pressure, gauge pressure, Absolute pressure. Temperature- units, Meaning of N.T.P. and S.T.P. 1.5. Energy: —Types, Thermodynamic definition of Heat and Work, Difference between heat and work, internal energy, entropy, flow work and enthalpy. 1.6. Perfect gas and real gas, Equation of state, characteristic gas constant, Mole of gas, Universal gas constant.	**10**

	1.7. Specific heats of ideal gas, relation between specific heats and Characteristic gas constant. 1.8. Zeroth Law of Thermodynamics 1.9. First law of Thermodynamics, Mechanical equivalent of heat, General energy equations for non-flow process & flow process, principle of conservation energy. 1.10. Second law of Thermodynamics- statement (Kelvin-Planck & Claudius), C.O.P of refrigerator and heat pump. (Simple numerical). 1.11. Various Thermodynamic processes: Isobaric, isochoric, Isothermal, Adiabatic, Isentropic and Polytrophic with representation on P-V & T-S diagram, formula for work done, heat transfer, change in internal energy, enthalpy, entropy etc. (Derivations) (Simple numerical)	
2	**Air Standard cycles** 2.1. Introduction – assumptions – efficiency of the cycle, Reversible cycle – Irreversible cycle. 2.2. Types of air Standard thermodynamic cycles – Carnot cycle –Otto cycle – Diesel cycle – Dual combustion cycle,- Joule's cycle -Open and close Brayton cycle– derivation – P-V & T-S diagram, their efficiencies & simple problems.	**7**
3	**Properties of steam andmain components of steam power plant** 3.1. Formation of steam, Basic terms associated with steam formation: saturated liquid line, saturated vapour line, liquid region, vapour region, wet region, superheat region, critical point, saturated liquid, saturated vapour, saturation temperature, sensible heat, latent heat, wet steam, dryness fraction, wetness fraction, saturated steam, superheated steam, degree of superheat 3.2. Steam Table & its use, Enthalpy- Entropy diagram of steam (Mollier Chart) and its use. (Simple Numerical) 3.3. Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure and temperature using steam tables (Simple Numerical) 3.4. Study of boiler-Water Tube & Fire Tube boiler, boiler mounting and Accessories. [only name, location in boiler and function] 3.5. Steam condenser, function, location in steam power Plant. 3.6. Steam Turbine: Classification of turbine, location in steam	**6**

	power plant.	
4	**Air Compressors** 4.1. Uses of compressed air; 4.2. Functions and Types of air compressors; Single stage reciprocating air compressor - its construction and working (with line diagram) using P-V diagram; (simple Numerical) 4.3. Multi stage compressors – Advantages over single stage compressors, - inter cooler. (No numerical) 4.4. Rotary compressors: Centrifugal compressor, axial flow compressor, screw compressor and vane type compressors.	**4**
5	**Refrigeration & Air-conditioning** **<u>Refrigeration</u>** 5.1. Definition – Refrigeration, heat pump, heat engine, C.O.P, EER (Energy Efficient Ratio),ISEER (Indian Sessional Energy Efficient Ratio), BEE Star Rating,& unit of refrigeration 5.2. Refrigerant – properties required, common commercial refrigerants, Environment friendly refrigerants. 5.3. Air Refrigeration system, Bell Coleman cycle (reversed Joule cycle): components, working & applications; 5.4. Vapour Compression system: components, working & applications (schematic layout, p-h diagram, function & working of each component in the circuit)..(No Numerical) **<u>Air conditioning</u>** 5.5. Definition and classification of Air conditioning 5.6. Basic concept of Psychrometry including the following: 5.7. Dry air – Moist Air, - Water Vapour, - Saturated air – dry bulb temperature - wet bulb temperature – dew point temperature -humidity - specific and relative humidity and Degree of saturation. Psychrometer. 5.8. Psychometric chart and its uses – psychometric processes – sensible heating and cooling – humidification – dehumidification.(No Numerical) 5.9. Industrial Air-Conditioning; Window Air-Conditioner; Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air-Conditioning system. 5.10. Car Air conditioning system. (only block diagram and working)	**9**

6	**Heat Transfer** 6.1. Modes of heat transfer--- Conduction, Convection and Radiation. 6.2. Conduction- Fourier's law, thermal conductivity- its units. Conduction through composite walls, Thermal resistance. [Simple numerical]. 6.3. Convective heat transfer – Newton's law of cooling, Heat Transfer Co-efficient – its units, Combined conduction and convection, Heat exchanger, types & application, Overall heat transfer co-efficient. [Simple numerical]. 6.4. Heat transfer by Radiation [for introductory concept only]: -- Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and grey bodies, Stefan-Boltzman law. (No numerical) 6.5. Application of concept of heat transfer in automobiles.	**6**
	Total Number of Contact Hours	**42**

Weightage distribution in both objective, short and long answer type questions::

Group Name	Unit Number	Weightage (%)
A	1 & 2	40
B	3, 4 & 5	45
C	6	15

Course Outcome:

At the end of the course, the student will be able to:

CO1	Familiar with heat, work, thermodynamics law and different thermodynamics process.
CO2	Calculate the work done, enthalpy, internal energy, entropy and thermal efficiency of air stander cycle.
CO3	Distinguish between water tube and fire-tube boilers and explain the function all the mountings and accessories of boiler and turbine and also know the uses of steam tables.
CO4	Describe the constructional features of air compressor and working of different air compressors.
CO5	Know about the refrigeration and air-conditioning process and different psychometric properties.
CO6	Methodize the different heat transfer process and their application.

Text Books:

1. Thermal Engineering – R.S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, NewDelhi.
2. A Course in Thermal Engineering – S. Domkundwar& C.P. Kothandaraman, Dhanpat Rai& Publication, New Delhi

Reference Books:

1. Treatise on Heat Engineering in MKS and SI Units – V.P. Vasandani& D.S. Kumar, Metropolitan Book Co. Pvt. Ltd, New Delhi.
2. Thermal Engineering – P.L. Ballaney, Khanna Publishers, 2002
3. Thermal Engineering – R. K. Rajput,8th Edition, Laxmi publications Pvt Ltd, New Delhi.
4. Thermal Engineering - Mahesh M. Rathore, McGraw Hill India

Syllabus of Automotive Materials and Manufacturing Processes

Course Code	AEPC 303
Course Title	Automotive Materials And Manufacturing Processes
Number of Credits and L-T-P	42 (L-3, T-0, P-0)
Course Category	PC
Prerequisites	Nil

Course Objectives:

1. To gain knowledge about different categories of engineering materials along with their properties and application in automotive industries
2. To gain knowledge about different types of manufacturing processes along with their characteristics and proper use in automotive industries
3. To gain knowledge about different manufacturing processes those enhance the mechanical properties of the metallic materials required for automotive industries
4. To gather basic knowledge about formation of different standard surfaces by means of machine tools like lathe

CourseContents:

Module No.	Description of Topic	Contact Hrs.
1	**1. Engineering Materials** 1.1. Introduction 1.2. Classification of engineering materials 1.3. General properties, uses of different types of engineering materials	**(2)**
2	**2. Metals & Alloys** 2.1. Ferrous & nonferrous metals & its alloys used for automotive 2.2. Steels: carbon steel and alloy steels used in automobile industries 2.3. Effects of alloying elements on steel like chromium, nickel, silicon, molybdenum, tungsten, etc. 2.4. Application of various steel along with their composition 2.5. Aluminium & its alloys, such as wrought Aluminium, 2xxx series (alloyed with Copper), 3xxx series (alloyed with Manganege), 4xxx series (alloyed with Silicon) & 5xxx series (alloyed with Magnesium): composition, properties and use	**(4)**

	2.6. Copper & its alloys such as wrought copper, leaded copper, leaded brass, leaded bronze: composition, properties and use	
3	**3. Polymers, Ceramics & Composite Materials** 3.1. Thermoplastics and thermosetting plastics: properties and applications 3.2. Thermoplastics-Nylons and Polypropylene. Thermosetting Plastics-Epoxy resins and Polyesters Rubber – Natural andsynthetic: Properties & applications (no detail) 3.3. Properties and applications of different ceramic materials like glass, in automotive industries 3.4. Composite materials: Metals MatrixComposite, CeramicsMatrixComposite, Polymers MatrixComposite such as Carbon Fibre Reinforced Plastic, Carbon Fibre Reinforced Plastic, Natural Fibre Reinforced Plastic: Application area	**(4)**
4	**4. Manufacturing processes** 4.1. Definition and classification of manufacturing processes 4.2. Concepts of formative, subtractive and additive manufacturing; their applications 4.3. Concepts of property improvement processes and joining processes; their examples	**(2)**
5	**5. Formative manufacturing processes** 5.1. Different formative processes used for manufacturing automobile parts: casting, forging, rolling, extrusion 5.2. Working principle and use of forging, rolling and extrusion. 5.3. Classification of forging processes with application area 5.4. Examples of different automobile components made of forging, rolling, extrusion 5.5. Working principle and use of casting process 5.6. Concepts of moulding and moulding sand 5.7. Concepts of pattern and their allowances 5.8. Working principle, advantages and limitations of some modern casting processes like centrifugal casting, die casting and shell moulding 5.9. Concepts of some press works like blanking, piercing, notching, lancing, spinning, trimming, shaving and deburring.	**(12)**
6	**6. Subtractive manufacturing processes** 6.1. Chip and cutting tool 6.2. Mechanism of chip formation 6.3. Type of chip 6.4. Type of cutting tool:	**(4)**

	• single point and multi-point cutting tool • carbide tools, ceramics tools and CBN tools 6.5. Speed, feed, depth of cut both 6.6. Surfaces produced by different machine tools such as Lathe, drilling, milling, shaping machine	
7.	**7. External cylindrical surfaces manufacturing** 7.1. Lathe and its characterises 7.2. Specification of lathe 7.3. Important components of a Lathe and its function 7.4. Job holding devices, such as centre, chucks, dog, face plate, etc. 7.5. Tool holding devices 7.6. Types of tool used in lathe like solid shank, insert type, brazed tool, etc. 7.7. Different operation performed by a lathe to produce different external cylindrical surfaces like • Turning, • Taper turning • Thread cutting • Knurling • Grooving and shouldering 7.8. Cantering and facing operation done by lathe	**(7)**
8.	**8. Properties improvement processes: Heat treatment** 8.1. Heat treatment is a manufacturing process 8.2. Concept of phase and phase transformation 8.3. Iron-Iron Carbide (Fe-Fe3C) equilibrium diagram 8.4. Common heat treatment processes and their application • Annealing • Normalizing • Hardening, • Tempering 8.5. Principle and use of surface hardening processes like • Carburizing, • Nitriding, • Cyaniding, 8.6. Induction and flame hardening	**(7)**
	Total Number of Contact Hours	**42**

Weightage distribution in both objective, short and long answer type questions::

Group Name	Unit Number	Weightage (%)
A	1, 2 & 3	40
B	4, 5 & 6	40
C	7 & 8	20

Course Outcomes:

At the end of the course, the student will be able to:

CO1	Illustrate different fundamental categories of engineering materials along with their properties and application in automotive industries
CO2	Explain fundamental classes of manufacturing processes such as formative manufacturing processes along with different sub-categories and their use in automotive industries
CO3	Explain fundamental classes of manufacturing processes such as subtractive manufacturing processes and their use in automotive industries
CO4	Explain working principles, characteristics and method of forming different types of external cylindrical surfaces produced by a Lathe

Reference Books:

1. A Text Book of Material Science & Metallurgy – O.P. Khanna, Dhanpath Rai and Sons, New Delhi. 2003.
2. Material Science & Engineering – R.K. Rajput, S.K. Kataria & Sons, New Delhi, 2004.
3. Material Science – R.S. Khurmi, S. Chand & Co. Ltd., New Delhi, 2005.
4. Manufacturing technology – P N Rao, Tata McGraw-Hill Publications
5. Elements of workshop Technology (Volume I & II) – S. K. Hajra Chaudary, Bose & Roy, Media Promoters and Publishers Limited.
5. Manufacturing Technology, Metal Cutting & Machine tools– P. N. Rao, Tata McGraw-Hill Publications
6. Production Technology – R.B. Gupta, Satya Prakashan, New Delhi

Syllabus of Automotive Chassis

Course Code	AEPC 304
Course Title	Automotive Chassis
Number of Credits and L-T-P	3 [L – 3, T – 0, P - 0]
Course Category	PC
Prerequisites	NIL

Course Objectives:

After completing this course, the students will be able

1. To learn about the constructional details of chassis.
2. To gain knowledge about various steering system, steering linkages and steering gear boxes
3. To learn about the phenomenon of different components used in suspension and brake systems.
4. To learn about the various aspects of wheels and tyres.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	**Vehicle layout and Chassis frame** 1.1 Definition of an automobile. 1.2 General Vehicle layout; types of layout. 1.3 Classification of Vehicle layout with respect to Drive, Location of Engine, Arrangement of Engine (with Sketch) 1.4 Major assemblies – their locations and their functions. 1.5 Necessity of Frame and its functions 1.6 Type of frames, Conventional (Ladder and X – Member type), Semi integral and Integral types, frames construction, material, frame alignment. Frame sections- Channel, Box and Tubular Sections 1.7 Classification and Specifications of Chassis. 1.8 Defects in frames 1.9 Different Chassis Parameters (definitions)	**6**
2	**Front Axle and Steering** 2.1 Front Axle: Types of front axle - Dead axle, live axle. 2.2 Type of stub axle arrangements- Elliot, reverse Elliot,	**6**

	Lamoine, and reverse Lamoine. 2.3 Front wheel assembly. 2.4 Steering system. 2.5 Steering linkages. Steering geometry and its effects –Caster, camber and king pin Inclination, toe in– toe out, correct steering angle. Under steering and over steering, Turning radius. 2.6 Working Principle, Construction and application of Steering gear box – rack and pinion type, recirculating ball type, worm and roller type. 2.7 Construction and application of Steering gear box – worm and sector, screw and nut, worm and peg. 2.8 Adjustable steering system, Collapsible steering column, construction & working Principle. 2.9 Ackerman and Davis Steering Principle and linkage. 2.10 Defects & Troubleshooting	
3	**Suspension Systems** 3.1 Functions of suspension system. Sprung weight, unsprung weight, common suspension terms 3.2 Front and rear axle suspension, rigid and independent suspension, comparison. 3.3 Types of Rigid Axle suspension system - parallel leaf spring type, leading arm and trailing arm type, trailing arm with twist beam type, four link type 3.4 Types of Independent suspension system – McPherson Strut, Wishbone type 3.5 Leaf spring and their types, Helper springs (variable rate springs), coil spring torsion bar arrangement and shock absorber. 3.6 Use of Anti roll bar, stabilizer bar. 3.7 Shock absorbers – Telescopic and Gas Filled 3.8 Suspension system trouble shooting	**8**
4	**Brake System** 4.1 Introduction, Principle of braking. 4.2 Function and necessity of brakes, Braking Effect- weight transfer. 4.3 Classification of brakes and braking systems. 4.4 Construction and working of - Drum brake. 4.5 Concept of Leading Shoe & Trailing Shoe. 4.6 Friction materials used for brake shoes and pads. Characteristics of friction material - brake fade, coefficient	**14**

	of friction, dry friction and wet friction. 4.7 Disc brake, types, construction and working principle, use. 4.8 Solid and ventilated disc brakes. 4.9 Comparison between Drum Brake and Disc Brakes 4.10 Construction and working of - Mechanical braking system. 4.11 Hydraulic Braking system, construction & working principle. 4.12 Master cylinder, wheel cylinder construction & working principle, bleeding of Brakes. 4.13 Properties of Brake Fluid and their specifications, Brake Bleeding. 4.14 Exhaust brake, Parking brake, Adjustments of Brakes, Brake Test. 4.15 Brake System Troubleshooting.	
5	**Wheels and Tyres** 5.1 Wheels – Functions, Types of wheels, wired spoke wheel, disc and alloy wheels 5.2 Tyre- Necessity of Tyre, construction, working and comparison of a tubed tyre and tubeless tyre 5.3 Type of Rims. 5.4 Types of tyre- Radial, Cross Ply, Belted Bias Tyre. 5.5 Specification of tyre, Concept of Aspect Ratio 5.6 Types of Tread patterns 5.7 Effect of Inflation pressure on the life of tyre and tyre rotation 5.8 Tyre materials, construction, Tubular tyres. 5.9 Airless tyres 5.10 Balancing of wheel tyre assembling (static and dynamic). • Tyre Rotation. • Tyre Retreading. • Tube Vulcanizing. 5.11 Factors affecting tyre performance and life. 5.12 Troubleshooting of Wheels and tyres	**8**
	Total Number of Contact Hours	**42**

Weightage distribution in both objective, short and long answer type questions::

Group Name	Unit Number	Weightage (%)
A	1 & 2	40

B	3 & 4	40
C	5	20

Course Outcomes:

At the end of the course, the student will be able to:

CO1	Classify the chassis layout with reference to the power train location.
CO2	Explain the different designs consideration of front axles and steering system for proper rolling of the tyre.
CO3	Explain the types of wheels and its constructional details which are used in Automobile.
CO4	Explain the various Braking systems and in which circumstances each one of them is used.

Text Books:

1. Automobile Engineering, Vol.1, Dr. Kripal Singh, Standard Publishers
2. Automotive Chassis, A. K. Babu, Scitech Publications

Reference Books:

1. Automobile Engineering, Prof. R.B. Gupta, Dhanpat Rai Publishing Company (P) Ltd.
2. A Textbook of Automobile Engineering, R.K. Rajput, Laxmi Publications
3. Automobile Engineering, Sudhir Kumar Saxena, Laxmi Publications
4. Automobile Engineering, Kamaraju Ramakrishna, PHI Learning Private Limited
5. Automobile Engineering, K. K. Ramalingam, Scitech Publications

Syllabus of Automotive Engines

Course Code	AEPC 305
Course Title	Automotive Engines
Number of Credits and L-T-P	3 [L – 3, T – 0, P - 0]
Course Category	PC
Prerequisites	Nil

Course Objectives:

After completing this course, the students will be able

1. To gain knowledge on basics of automotive SI and CI engines, their types, construction, working principle and comparison.
2. To study the cooling and lubricating systems adopted in automobile engines.
3. To learn the properties of gasoline and diesel fuel and combustion process involved in petrol and diesel engines.
4. To gain knowledge on the fuel feed systems of petrol and diesel engines.
5. To study the different parameters relating to engine performance and to learn the pollution characteristics of SI and CI engine.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	**Engine Fundamentals and Constructional Features** 1.1 Engine terminology – bore, stroke, TDC, BDC, clearance volume, swept volume, compression ratio, volumetric efficiency. 1.2 Classification of engine, Concept and working of 4-stroke petrol engine, 4-stroke diesel engine, 2-stroke petrol engine, Comparison. 1.3 Engine working cycles – Theoretical and actual Otto & Diesel cycle. 1.4 Constructional features of engine components – (use, location, application, material) • Cylinder block and cylinder liners. • Piston assembly • Connecting rod • Crank shaft • Flywheel	**7**

	• Camshaft • Valve – Poppet valve, valve actuating mechanism, valve timing diagram • Manifolds – inlet and exhaust • Mufflers	
2	**Engine Cooling and Lubrication System** 2.1 Engine Cooling System – Purpose of cooling, types of cooling system. 2.2 Air cooling system – components, uses, merits and demerits. 2.3 Water cooling system components – water jacket, cooling pump, thermostat valve, cooling fan, radiator - working principle. 2.4 Engine Lubrication System – Function, types of lubricating system, properties of lubricating oil, rating of lubricating oil. 2.5 Layout and working of – Splash lubrication, petrol-oil lubrication, wet sump lubrication, dry sump lubrication, applications. 2.6 Causes of oil consumption and oil contamination, crank-case ventilation.	**8**
3	**Fuels - Properties & Combustion Theory** 3.1 Hydrocarbon fuels – Calorific value of fuel (HCV & LCV), Properties of SI and CI engine fuel, Octane Number, Cetane Number, Fire Point, Flash Point, Cloud Point. 3.2 Combustion in SI engine – Stages of combustion, Ignition lag, Flame propagation, Rate of pressure rise, Factors affecting combustion in SI engine. 3.3 Abnormal combustion in SI engine – Pre-ignition, Detonation, Surface ignition, their effects on performance of engine, control of abnormal combustion. 3.4 Combustion in CI engine – Stages of combustion, Delay period – its' significance, factors affecting delay period, importance of air motion in CI engine, Complete Combustion – importance of excess air. 3.5 Abnormal combustion in CI engine – Knocking – its' effects and control, difference between abnormal combustion in SI and CI engine. 3.6 Engine Troubleshooting - Probable causes and remedies of different symptoms like black smoke, blue smoke, white smoke, engine overheating, excessive fuel consumption, excessive oil consumption, different noises etc.	**8**

4	**Fuel Feed System in Petrol Engine** 4.1 Layout of fuel feed system in petrol engine, Gravity feed system. 4.2 Components of fuel feed system – Construction & Working of fuel pump (Mechanical & Electrical), air cleaner (dry & wet type), Simple Carburettor. Electronic Carburettor – Principle and application. 4.3 Air-fuel ratio – Concept of rich and lean mixture, Requirement of mixture strength at during different operating conditions like starting, idling, cruising, acceleration etc., Limitations of carburettor. 4.4 Petrol injection – Necessity, Advantages of petrol injection, Disadvantages, Comparison with carburetted fuel supply system.	**6**
5	**Fuel Feed System in Diesel Engine** 5.1 Layout of fuel feed system in diesel engines, Types of diesel injection system – Layout of Unit injection, Distributor system and Common Rail system. 5.2 Basic components – Fuel tank, Fuel lines, Fuel filters, Fuel feed pump, Air Cleaner, Fuel injection pump, Fuel injectors. 5.3 Fuel Injection Pump – Construction & operation of Inline and Distributor type pump, Phasing and calibration of FIP. Overview of electronic Fuel Injector. 5.4 Governor – Purpose of governor, Types of governor, Working of mechanical governor.	**6**
6	**Engine Performance & Testing** 6.1 Engine Performance parameters - Engine torque, Brake power, Indicated power, Frictional power, Mean effective pressure [on IP & BP], Fuel Consumption, Specific fuel consumption. 6.2 Engine efficiency – Indicated thermal efficiency, Brake thermal efficiency, Mechanical Efficiency, Efficiency ratio, Air standard efficiency, Volumetric Efficiency [on mass & volume]. 6.3 Measurement of brake power – Dynamometer, Types of dynamometer, Rope brake dynamometer. 6.4 Measurement of power of single cylinder and multi cylinder engines with the help of Morse test. 6.5 Making a heat balance sheet. 6.6 Simple problems to calculate engine power, efficiency etc.	**7**

	and preparation of heat balance sheet.	
	Total Number of Contact Hours	**42**

Weightage distribution in both objective, short and long answer type questions::

Group Name	Unit Number	Weightage (%)
A	1 & 2	30
B	3 & 4	40
C	5 & 6	30

Course Outcomes:

At the end of the course, the student will be able:

CO1	To understand the actual engine working principle of 2-stroke/4-stroke, SI and CI engines and their comparisons.
CO2	To define and identify various components of SI and CI engines and their sub-systems - cooling, lubrication and fuel feed system.
CO3	To gain basic knowledge on SI and CI engine combustion and its related parameters.
CO4	To apply their knowledge in analyzing the engine performance and pollution characteristics.

Reference Books:

1. R. B. Gupta, Automobile Engineering, Satya Prakashan, New Delhi.
2. Dr. Kirpal Singh, Automobile Engineering (Vol. – 2), Standard Publishers Distributors, New Delhi.
3. S. Srinivasan, Automotive Mechanics, Tata McGraw Hill Education, New Delhi.
4. M. L. Mathur and R.P.Sharma, Internal Combustion Engine, Dhanpath Rai Publications (P) Ltd, New Delhi.
5. V. Ganesan, Internal Combustion Engines, Tata-McGraw Hill Publishing Co., New Delhi.

Syllabus of Heat Power Engineering Lab

Course Code	AEPC 306
Course Title	Heat Power Engineering Laboratory
Number of Credits and L-T-P	2 [L – 0, T – 0, P - 2]
Course Category	PC
Prerequisites	Nil

Course Objectives:

After completing this course, the students will be able

- To familiar with theworking of boilers and identify the differentaccessories and function of accessories.
- To know the process of dismantling and assembling of compressors and identify the different component.
- To differentiate the different type of heat exchanger.
- To identify the different component of Refrigeration and Air conditioning Unit.
- To differentiate between Refrigeration unit and Air Conditioning Unit

At least 06 practical have to be done.

Sl No.	Topics for Practice	Contact Hrs.	Remark (whether mandatory or not)
1	Study and compare various heat exchangers such as radiators, evaporators, condensers, plate type heat exchangers etc. by using either actual cut-section model or with the help of presentations/charts/animated videos/ wooden or metallic models etc.	6	Mandatory
2	Conduct performance test on A/C test rig to determine COP	6	At-list one from Sl. No 2 & Sl. No. 3
3	Conduct performance test on Refrigeration Test Rig to determine COP of the refrigerator	6	
4	Thermal conductivity test of a solid metallic rod or thick slab	4	At-list one from Sl. No 4 & Sl.No. 5
5	Calculation of STEFAN BOLTZMANN CONSTANT of sphere.	4	
6	Study of high-pressure boiler (With the help of presentations/charts/animated videos/ wooden or metallic models etc.)	4	Optional

7	Study of boiler mountings and accessories (With the help of presentations/charts/animated videos/ wooden or metallic models etc.)	4	Optional
8	Study of Refrigeration unit. (With the help of presentations/charts/animated videos/ wooden or metallic models/actuals cut section model etc.)	4	Optional
9	Study of Air Conditioning Unit. (With the help of presentations/charts/animated videos/ wooden or metallic models/ actuals cut section model etc.)	4	Optional
10	Dismantling and assembling of one reciprocating or one rotary compressor.	4	Optional
11	Conduct performance test on single stage reciprocating compressor	4	Optional
12	Demonstration of Leak detection of refrigeration unit. (by using either actual model or with the help of presentations/charts/animated videos/ wooden or metallic models etc	4	Optional
	Total Number of Contact Hours	**28**	

Course Outcome:

At the end of the course, the student will be able to:

CO1	Recognize the different component of compressor and boiler
CO2	Estimate the performance characteristics single stage air compressor
CO3	Find the thermal conductivity of metallic rod
CO4	Calculate the co efficient of performance of refrigerator and A/C
CO5	Characterize the different type of heat exchanger.

Reference Books:

1. Thermal Engineering – R.S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, New Delhi.
2. A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai& Publication, New Delhi

Syllabus of Automotive Materials and Manufacturing Processes Lab

Course Code	AEPC 307
Course Title	Automotive Materials and Manufacturing Processes Laboratory
Number of Credits and L-T-P	2 [L - 0, T - 0, P - 2]
Course Category	PC
Prerequisites	Nil

Course Objectives:

After completing this course, the students will be able

1. To gather knowledge about establishment of safety in working condition.
2. To gain knowledge about basic engineering materials used in automotive industries.
3. To know the different methods adopted in primary manufacturing processes like rolling, extrusion, forging, casting.
4. To develop knowledge and skill for promoting different metal cutting processes required in automotive industries made by lathe and drill along with press work.
5. To acquire knowledge about fundamental heat treatment processes adopted for enhancing mechanical properties of automobile parts.

CourseContents:

Sl. No.	Topics for Practice	Contact Hrs.	Remark (whether mandatory or not)
1	Develop one pattern for a given job considering all aspects of pattern making forgroup of 4 to 6 student. Job shall involve spit pattern with core, coreprint.	4	Mandatory
2	Prepare a sand mould for any one of the above patterns. Demonstrate the use of hand tools in preparation of moulding process.	5	Mandatory
3	Making of one job for group of 4 to 6 student involving followingoperations on a lathe machine: Facing, taper turning, step turning, threading, knurling operations **And/ or** Making of one job for group of 4 to 6 student involving followingoperations using a drilling machine: Drilling, reaming, counter boring, counter sinking, Spot	10	Mandatory

	facing operations.		
4	Prepare one wooden solid pattern per student as per givendrawing.	3	Optional (Any three of optional are compulsory)
5	With the help of presentations/charts/animated videos/wooden or metallic models etc. (wherever available) study of different Rolling processes along with their applications particularly in automotive field, advantages, limitations and probable defects.	3	Optional (Any three of optional are compulsory)
6	With the help of presentations/charts/animated videos/wooden or metallic models etc. (wherever available) study of Different Extrusion processes along with their applications particularly in automotive field, advantages, limitations and probable defects.	3	Optional (Any three of optional are compulsory)
7	With the help of presentations/charts/animated videos/wooden or metallic models etc. (wherever available) study of Different Forging processes along with their applications particularly in automotive field, advantages, limitations and probable defects.	3	Optional (Any three of optional are compulsory)
8	With the help of presentations/charts/animated videos/wooden or metallic models etc. (wherever available) study of Different Press Work processes along with their applications particularly in automotive field, advantages, limitations and probable defects.	3	Optional (Any three of optional are compulsory)
9	With the help of presentations/charts/animated videos/wooden or metallic models etc. (wherever available) study of different Heat treatment processes along with their typical applications in automotive industries, advantages and limitations.	3	Optional (Any three of optional are compulsory)
	Total Number of Contact Hours	**28**	

Course Outcomes:

At the end of the course, the student will be able to:

CO1	Explain working principle, applications, advantages and limitations of different primary production systems along with press working.
CO2	Construct single piece pattern by individual students starting from a given drawing.
CO3	Develop pattern and sand mould projects in a group.

CO4	Demonstratedifferent fundamental machining operations on a lathe and/or drill machine.
CO5	Explain working principle, applications, advantages and limitations of heat treatment processes.

Reference Books:

1. S. K. Hajra Choudhury, A. K. Hajra Choudhury, Elements of Workshop Technology. Vol. - I and II, Media Promoters and Publishers Pvt. Ltd.
2. P. N. Rao, Manufacturing Technology, Vol. –I, II & III, The McGraw Hill Co.
3. Gerling, All about Machine Tools, Wiley Eastern Limited.
4. B. S. Raghuwanshi, Workshop Technology, Vol- I, II & III, Dhanpat Rai& Co.

Syllabus of Automotive Chassis Lab

Course Code	AEPC 308
Course Title	Automotive Chassis Laboratory
Number of Credits and L-T-P	2 [L – 0, T – 0, P - 2]
Course Category	PC
Prerequisites	Nil

Course Objectives:

After completing this course, the students will be able

1. To understand the various dimension and terms related to chassis.
2. To understand the working of steering system and steering gearbox.
3. To observe various parts of axles and understand their functions.
4. To perform various tests on wheel geometry and calculate the different parameters.
5. To understand various parts of braking and suspension system of a vehicle.

Course Content:

Sl. No.	Topics for Practice	Contact Hrs.	Remarks (whether mandatory or not)
1	Study of safety precautions to be followed and knowledge of first aid in an automobile workshop.	2	Mandatory
2	Study, measurement and drawing of schematic diagram of a car/ vehicle chassis. Parameters to be measured i. Wheel Base ii. Front Track iii. Rear Track iv. Ground Clearance v. Overall Length vi. Overall Height from Ground vii. Front Overhang viii. Rear Overhang ix. Angle of Approach x. Angle of Departure xi. Ramp break over angle	2	Mandatory (at least six parameters to be measured)

	xii. Eyebrow height (Front and rear)		
3	Study of steering system assembly.	2	Mandatory
4	Dismantling and assembling of steering gearbox. a) Rack and Pinion b) Recirculating Ball c) Worm and Roller	6	Mandatory
5	Study of different types of front and rear axles. i. Front Axle a) Dead axle b) Live axle ii. Rear Axle a) Semi floating rear axle b) Full floating rear axle c) Three quarter floating rear axle. iii. Stub Axle a) Elliot b) Reverse Elliot c) Lamoine d) Reverse Lamoine	6	Mandatory (any two stub axle)
6	Study and measurement of different wheel geometry. Parameters to be measured i. Caster ii. Camber iii. King pin inclination iv. Toe in– Toe out	2	Mandatory
7	Study and measurement of different parts of braking system. a) Disc Brake b) Drum Brake Parameters to be measured i. Master cylinder push rod length ii. Diameter of push rod iii. Travel of push rod (stroke of master cylinder) iv. Thickness of Pad for Disc v. Rotor thickness	4	Mandatory

	vi. Rotor swept area vii. Type of caliper viii. No of Piston (action and reaction type) ix. Caliper pin diameter x. Width of the shoe xi. Diameter of the drum xii. Shoe length xiii. Drum to shoe clearance xiv. Thickness of lining xv. Wheel cylinder (No of Piston) xvi. Type of shoe (L/T)		
8	Study and measurement of different parts of front suspension and rear suspension. a) McPherson Strut b) Wishbone arm c) Leaf Spring	4	Mandatory
	Total Number of Contact Hours	**28**	

Course Outcomes:

At the end of the course, the student will be able to:

CO1	Evaluate the different dimensions related to chassis.
CO2	Describe the steering system, sub-systems and its application.
CO3	Distinguish between different types of axles and their usage.
CO4	Demonstrate the different wheel geometries.
CO5	Explain the application of different braking and suspension systems of automobile.

Reference Books:

1. Automobile Engineering, Prof. R.B. Gupta, Dhanpat Rai Publishing Company (P) Ltd.
2. A Textbook of Automobile Engineering, R.K. Rajput, Laxmi Publications

Syllabus of Automotive Engine Lab

Course Code	AEPC 309
Course Title	Automotive Engine Laboratory
Number of Credits and L-T-P	2 [L – 0, T – 0, P - 2]
Course Category	PC
Prerequisites	Nil

Course Objectives:

After completing this course, the students will be able

1. To know the use of different tools and special tools used for dismantling and assembling automobile engines.
2. To gather knowledge about the basic operation of different types of engines used in automobiles.
3. To identify the various components of the cooling and lubrication system and know their locations and functions.
4. To gain knowledge on the fuel feed systems of petrol and diesel engines.
5. To perform engine performance tests to calculate engine power and efficiency.

Course Contents:

Sl. No.	Topics for Practice	Contact Hrs.	Remark (whether mandatory or not)
1	Operate Cut Section model to know engine nomenclature, understand basic engine operation, identify, locate and compare various components of - a) Four stroke Petrol Engine b) Four stroke Diesel Engine c) Two stroke petrol Engine	8	Mandatory
2	Conduct engine performance test in Engine Test Rig for petrol/ diesel engines to find engine performance parameters and prepare heat balance sheet.	6	Mandatory
3	Dismantle & Assemble an Engine and practice the same. Identify and know the operations and functions of different general & special tools used for dismantling and assembling the engine.	6	Mandatory
4	With the help of cut section models / charts / presentations / animated videos etc., study the cooling system of an engine; identify and locate the	4	Optional

	various components and draw its layout.		
5	With the help of cut section models / charts / presentations / animated videos etc., study the lubricating system of an engine; identify and locate the various components and draw its layout.	4	Optional
6	With the help of cut section models / charts / presentations / animated videos etc., study the various components of the fuel supply system of petrol & diesel engines, compare their operation and draw their layout.	4	Optional
7	Construct the Valve timing diagram of a four-stroke engine.	4	Optional
	Total Number of Contact Hours	**28**	

Note: Students must perform six practical with Sl. No. 1, 2 and 3 as compulsory and any two from the optional.

Course Outcomes:

At the end of the course, the student will be able to:

CO1	Explain the operation of different engines used in automobiles, identify and locate their components.
CO2	Describe the operation, location and function of the components of cooling and lubricating system of automobiles.
CO3	Demonstrate the location and function of the components of the fuel supply system.
CO4	Conduct engine performance test to find out the power, efficiency and other performance parameters of an engine.

Reference Books:

1. R. B. Gupta, Automobile Engineering, Satya Prakashan, New Delhi.
2. Dr. Kirpal Singh, Automobile Engineering (Vol. – 2), Standard Publishers Distributors, New Delhi.

Syllabus of Internship - I

Course Code	SI201
Course Title	Internship - I
Number of Credits and L-T-P	1 [L – 0, T – 0, P - 0]
Course Category	Internship - I
Prerequisites	Up to 2nd semester all subject knowledge

Course Objectives:

After completing this course, the students will be able

- To recognize the working environment, that cannot be simulated in the classroom.
- To achieve some idea about the real time technical knowledge/ managerial skills required for completing the provided job.
- Exposure to the current technological developments relevant to the subject area of training.
- To gain idea about the Technical knowledge in real industrial/ academic situations.
- To gain an idea about Technical reports/projects reports writing.
- To aware regarding the responsibilities and ethics of an engineer's.
- To understand the social, economic and administrative thoughts that influences the working environment.

After 2nd semester, for Internship I, students are required to be involved in Inter/ Intra Institutional activities viz; Training and simulation programmed with different Institute like workshop of ITI, Other Polytechnics and Technical Institutes Institutions; Soft skill training (*Technical Drawings/ Auto CAD for Automobile/ Mechanical engineering in Inter/ Intra Institution/ Online technical courses / Mini project as beginner in Sci Lab/ Tinkercad/ any other simulation software in Inter/ Intra Institution*)/ industrial training/ automobile workshop training organized by Training and Placement Cell of the respective institutions; contribution at innovation/ entrepreneurship cell of the institute; participation in workshops/ competitions etc; Learning at Departmental lab/ Institutional workshops.

After completion of Internship, the student should prepare a comprehensive report to indicate what he/ she has observed and learnt in training period. The student may contact Industrial Supervisor/ Faculty Mentor/ TPO for assigning topics and problems and should prepare the final report on the assigned topics. The training report should be signed by the Industrial Supervisor/ Internship Faculty Mentor, TPO and HOD.

The Internship Report will be evaluated on the basis of following criteria (as applicable).

60 Marks

Sl. No.	Criteria for evaluation of Internship Report
1	Originality
2	Adequacy and purposeful write up
3	Organizations, format, drawing, sketches, style, language
4	Practical applications and relationships with basic theory
5	Concept taught in the course outcome
6	Practical applications, relationships with basic theory and concept taught in the course
7	Attendance record, daily diary, quality of Internship Report.

Seminars must be arranged for the student based on his/her training report, before an Internal Committee constituted by the concerned department of the Institute. The evaluation will be based on the following criteria.

40 Marks

Sl. No.	Criteria for evaluation of Internship Report
1	Quality of content presented
2	Proper Planning for presentation
3	Effectiveness of presentation
4	Depth of knowledge and skills
5	Viva voce

Course Outcome:

At the end of the course, the student will be able to:

CO1	Learn new skills and supplement knowledge
CO2	Learn & practice communication and teamwork skills.
CO3	Learn strategies like time management, multi-tasking, real time technical knowledge etc. in a working environments setup.
CO4	Meet new people and learn social and professional networking skills.
CO5	Gain practical experience in a real working environment setting.