SABARMATI UNIVERSITY
BACHELOR OF VOCATIONAL STUDIES
SEMESTER I
Automobile Engineering
(B.VOC-AE)

Subject		Course No.	Subject Title	T/P	Credit			Exam Duration	Marking Scheme		
					T	P	T		Internal	External	Total
Discipline Specific Course Core (Major)	Core Course-1	BV01AEMAC01	Elements Of Automobile Engineering	T/P	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV01AEMAC02	Manufacturing Technology	T/P	1	-	1	2	25/09	25/09	50/18
Minor	Minor Course	BV01AEMIC03	Fundamentals Of Automobile Engineering	T/P	1	-	1	2	25/09	25/09	50/18
Multi-Disciplinary	Multi-Disciplinary	BV01AEMDC04	Computer Skill – I	T/P	1	-	1	2	25/09	25/09	50/18
Ability Enhancement Course		BV01AEAEC05	Communication Skill– I	T/P	1	-	1	2	25/09	25/09	50/18
Skill Enhancement Course/Internship/ Dissertation		BV01AESEC06	**Industrial Training – I**	P	-	15	15	4	-	600/216	600/216
IKS/Value Added Course		BV01AEIKS07	Indian Knowledge System	T/P	2	0	2	2	25/09	25/09	50/18
			Minimum Quantifying Credits		**7**	**15**	**22**				**900/324**

Course Code	**BV01AEMAC01**	Title of the Course	**Elements Of Automobile Engineering**
Total Credits Of the Course	**01**	Hours per Week	**02**

Course Objectives:	The objective of the Elements of Automobile Engineering course for vocational programs is to impart foundational knowledge of automotive systems, components, and their functionalities. Students will gain an understanding of basic principles in vehicle design, operation, maintenance, and troubleshooting, preparing them for entry-level positions in the automotive industry.

Course Content

Unit	Description	Weightage *(%)
1.	**Introduction:** – Classification of automobiles- according to number of wheels – Propulsion systems – Transmission drives – Type of fuels, application & capacity – Study of main specifications. Components of an automobile - functions & layout of frame – Frameless construction – Axles, steering system – Braking system – Power train & drives, clutch, gear box, final drive, – Propeller shaft, u-joints, vehicle body, wheels, tyres & tubes. **Power Unit:** – Selection of engine for two wheeler – Three wheeler & four wheeler vehicles – Constructional & working details of two strokes & four stoke petrol & diesel engines – Fuel system, ignition system, starting system, charging system, lighting system, cooling system, lubrication system – Combustion & combustion chambers	50%
2.	**Steering System and Suspension System:** – Steering system- requirements – Front axle details & steering geometry – Castor, camber, toe in, toe out steering axis inclination – Steering linkages, and different types of steering gear boxes, their constructional & working details – Concept and working of power steering	50%

	– Need, types of suspension systems – Constructional details, characteristics of laminated, coil springs – Introduction to independent suspension – front & rear suspension systems of the vehicle, shock absorbers. **Wheels, Tyres & Braking System:** – Wheel requirements – Types of wheels, their constructional & working details, rims & tyres, types of tyres, tyre selection – Ordinary, radial tyres tubeless tyres, their constructional details – Comparison & application, wheel balancing – Need and classification of brakes, drum brakes and disc brakes, constructional & working details – Introduction to hydraulic brake, parking brake, vacuum assisted hydraulic brakes – Air assisted hydraulic brakes, air brakes, leading & trailing brake shoes, self energizing brakes & abs – Working of master cylinder – Wheel cylinders, tandem master cylinder, characteristics of brake fluid	

Teaching-Learning Methodology	Teaching-learning methodologies for Elements of Automobile Engineering in vocational programs include theoretical lectures, practical demonstrations, hands-on workshops in automotive laboratories, case studies on vehicle components and systems, and field visits to automotive facilities. Emphasis is on integrating theoretical knowledge with practical skills to prepare students for technical roles in the automotive industry.

Evaluation Pattern

Sr.No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments.	
3.	University Examination	50%

Course Out comes :Having completed this course, the learner will be able to	
1.	Students will demonstrate proficiency in diagnosing and repairing common automotive systems and components, including engines, transmissions, and electrical systems.
2.	Students will acquire the skills to perform routine maintenance tasks and ensure the safe operation of vehicles, adhering to industry standards and enhancing their employability in the automotive sector.

Suggested References:

Sr. No.	**References**
1.	Newton Steeds and Garrot “Motor Vehicles”, Butterworths, London
2.	Judge A.W, “Mechanism of the Car”, Chapman and Halls Ltd., London
3.	Crouse W.H, “Automotive Chassis and Body”, Mcgraw –Hill, New York
4.	K.K. Jain, R.B. Asthana, “Automobile Engineering”, Tata McGraw Hill, New Delhi
5.	Dr. Kirpal Singh, “Automobile Engineering (Vol-1)”, Standard Publisher Distributors.

Course Code	**BV01AEMAC02**	Title of the Course	**Manufacturing Technology**
Total Credits Of the Course	**01**	Hours per Week	**02**

Course Objectives:	The objective of the Manufacturing Technology course for vocational programs is to equip students with fundamental knowledge and skills in manufacturing processes, materials, and quality control. Students will learn to apply principles of production planning, machining, casting, forming, and assembly, preparing them for roles in manufacturing industries with a focus on efficiency and quality.

Course Content

Unit	Description	Weightage *(%)
1.	**Casting Processes:** – Principles o f metal casting – Pattern materials – Type of patterns and allowance – Study of moulding sand – Moulding tools, moulding materials, classification of moulds, core, elements of gating and rising system, – Casting defects, description and operation of cupola – Special casting processes e.g. Die casting – Permanent mould casting, centrifugal casting, investment casting. **Welding & Metal Joining:** – Classification of welding processes – Principles and equipments used in the following processes – Gas welding – Oxyacetylene gas welding, equipments and field of application – Arc welding - metal arc, carbon arc, submerged arc and atomic hydrogen welding – Resistance welding – Spot, seam, butt, percussion welding – Thermit welding – Soldering, brazing. Standard welding symbol – Flux: composition, properties and function – Electrodes, types of joints and edge preparation, brazing and soldering	50%

2.	**Sheet Metal Work:** – Common processes – Tools and equipments – Metals used for sheets – Standard specification for sheets – Spinning, bending, – Embossing and coining **Metal forming and powder metallurgy:** – Basic concepts and classification of forming processes – Principles – Equipment used and application of following processes – Forging, rolling, extrusion, wire drawing, spinning – Powder metallurgy steps involved and applications	50%

Teaching-Learning Methodology	Teaching-learning methodologies for Manufacturing Technology in vocational programs include theoretical lectures, practical demonstrations in workshops, hands-on training on machines and equipment, industrial visits, case studies of manufacturing processes, and projects focusing on process optimization and quality assurance. Emphasis is on integrating theory with practical application to develop technical proficiency in manufacturing practices.

Evaluation Pattern

Sr. No	Details of the Evaluation	Weightage *(%)
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments.	
3.	University Examination	50%

Course Out comes :Having completed this course, the learner will be able to	
1.	Students will demonstrate proficiency in applying various manufacturing processes such as machining, casting, and forming to produce components and products to specified tolerances and standards.
2.	Students will develop the ability to analyze and improve manufacturing processes, ensuring efficiency, quality, and safety in industrial settings, thereby enhancing their employability in the manufacturing sector.

Suggested References:	
Sr. No	**References**
1.	K.P. Sinha, D.B. Goel, “Foundry Technology”, Roorkee Publishing House
2.	Richard L. Little, “Welding and Welding Technology”, Tata McGraw Hill Ltd.
3.	Rosenthal, “Principle of Metal Casting”, Tata McGraw Hill, New Delhi.
4.	Ostwald Phillip F., Munoz Jairo, “Manufacturing Processes and Systems”, John Wiley & Sons.
5.	P.N. Rao, “Manufacturing Technology-Foundry, Forming and Welding”, Tata McGraw Hill
6.	B.S. Nagendra Parasher, RK Mittal, “Elements of Manufacturing Processes”, Prantice Hall India ND

Course Code	**BV01AEMIC03**	Title of the Course	**Fundamentals of Automobile Engineering**
Total Credits Of the Course	**01**	Hours per Week	**02**

Course Objectives:	The objective of the Fundamentals of Automobile Engineering course for vocational programs is to provide students with foundational knowledge of automotive technology, including vehicle systems, components, and maintenance. Students will develop skills in vehicle inspection, diagnosis, and repair, preparing them for entry-level positions in the automotive industry with a focus on technical proficiency and safety standards.

Course Content

Unit	Description	Weightage *(%)
1.	**Unit 1: Introduction to Automobile Engineering** 1. **History and Evolution of Automobiles** o Invention and development of the automobile o Key historical milestones o Evolution of automotive technology 2. **Types of Automobiles** o Classification based on fuel type (Petrol, Diesel, Electric, Hybrid) o Classification based on purpose (Passenger, Commercial, Special purpose) o Two-wheelers, Three-wheelers, and Four-wheelers 3. **Automobile Systems Overview** o Chassis and Body o Powertrain: Engine, Transmission, Drivetrain o Electrical and Electronic Systems 4. **Materials Used in Automobile Construction** o Metals: Steel, Aluminum, Magnesium, Titanium o Non-metals: Plastics, Composites, Ceramics 5. **Automobile Manufacturing Process** o Design and Development o Assembly line production o Quality control and Testing 6. **Future Trends in Automobile Engineering** o Autonomous Vehicles o Connected Cars o Sustainable and Green Technologies	50%

2.	**Unit 2: Internal Combustion Engines** 1. **Fundamentals of Internal Combustion Engines** o Basic principles and operation o Four-stroke and two-stroke engines o Engine cycles: Otto, Diesel, and Dual cycles 2. **Components of an IC Engine** o Cylinder block, Cylinder head, Pistons, Crankshaft o Connecting rods, Camshaft, Valves, Flywheel 3. **Fuel Systems** o Carburetion: Principle, Types of Carburetors o Fuel Injection: Types (Direct and Indirect), Advantages over carburetion o Common Rail Direct Injection (CRDI) 4. **Ignition Systems** o Battery and Magneto Ignition Systems o Electronic Ignition System o Spark Plug, Ignition Coil, Distributor 5. **Cooling and Lubrication Systems** o Air cooling and Water cooling o Radiators, Coolant, Thermostat o Lubrication methods: Splash, Pressure, Dry and Wet Sump 6. **Engine Performance Parameters** o Power, Torque, Efficiency o Specific Fuel Consumption (SFC) o Emissions and Environmental Impact	50%

Teaching-Learning Methodology	Teaching-learning methodologies for Fundamentals of Automobile Engineering in vocational programs include theoretical lectures, practical demonstrations in automotive workshops, hands-on training on vehicle components, simulations of diagnostic procedures, and field visits to automotive service centers. Emphasis is on integrating theoretical knowledge with practical skills to prepare students for technical roles in the automotive industry.

Evaluation Pattern

Sr.No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments.	
3.	University Examination	50%

Course Out comes :Having completed this course, the learner will be able to

1.	Students will demonstrate proficiency in diagnosing and repairing automotive systems such as engines, transmissions, and electrical components, adhering to industry standards and safety protocols.
2.	Students will develop the ability to conduct routine maintenance tasks and inspections, ensuring the efficient and safe operation of vehicles, thereby enhancing their employability in the automotive sector.

Suggested References:

Sr. No.	References
1.	K. K. Ramalingam, “Automobile Engineering”, Scitech Publication, Chennai
2.	Tom Denton, “Automobile Mechanical and Electrical Systems” Indian Ed. , Routledge(T&F Group)Pub
3.	P. L. Kohli, “Automotive Chassis & Body”, Tata McGraw Hill, New Delhi
4.	Newton Steeds and Garrot “Motor Vehicles”, Butterworths, London
5.	Judge A. W, “Mechanism of the Car”, Chapman and Halls Ltd. , London
6.	Crouse W. H, “Automotive Chassis and Body”, Mcgraw - Hill, New York
7.	K. K. Jain, R. B. Asthana, “Automobile Engineering”, Tata McGraw Hill, New Delhi
8.	Dr. Kirpal Singh, “Automobile Engineering (Vol - 1)”, Standard Publisher Distributors

Course Code	**BV01AEMDC04**	Title of the Course	**Computer Skill – I**
Total Credits of the Course	01	Hours per Week	02

Course Objective:	1. To develop computer skill in commerce students. 2. Computer skill helps commerce students to meet the needs of modern business. 3. Computer skilled students can efficiently use Information and Communication Technology as modern businesses are highly rely on it. 4. Computer skill increase the chances of getting hired

Course Content

Unit	**Description**	**Weightage *(%)**
1.	**Components of a computer system** – Computer, computer Hardware and software, Difference between Hardware and Software, History of Computer, Computer Generation, Types of computer, Block Diagram of Digital computer and function of its each part, post-power on self-test. Application of computer, characteristics of computer, limitations of computer. – **Memory:** Types of Memory, primary Memory (RAM, DRAM, SRAM, SDRAM, DDR, SDRAM, ROM, PROM, EPROM, EEPROM), Auxiliary, memory, cache Memory. **Input, output and storage Devices** – **Input Devices:** Keyboard, scanners, Joy Stick, Barcode reader, Digital Camera, Microphone, webcam, pointing Devices (Mouse, Touchpad).Touch Screen, Light Pen, OMR, OCR, MICR, Digitizer, Trackball – **Output Devices:** Monitors (CRT, TFT, LCD, LED), printers (Laser, inkjet, Dot Matrix, line, MFP, Bar Code, plotter), speakers projector. – **Storage Devices:** CD, DVD, Blue Ray Disc, Floppy Disc, Hard Disk, Memory Sticks/Pen Drives, Flash Memory Cards etc. Difference between Main/Primary Memory and Secondary/Auxiliary Memory. – Relative benefits of each in terms of speed and performance.	50%

2.	**Introduction to Software, Operating System and Windows** – Introduction of Software, Types of Software and its Examples. Introduction of Operating System, Overview of Various Types of Operating Systems. Introduction of various version of Windows Operating System, Overview of Windows 7, Concept of booting and How to start Desktop Computer. – **Desktop:** Working with desktop Icons (Computer, My Documents, Recycle Bin, Start Menu (Parts of Start Menu), Browser, Taskbar Overview (Start Button, Quick Launcher toolbar, the notification are), Parts of window (Minimize-Maximize and close button, Menu bar, scroll bar, Borders and Corners), Switching between Windows. **Windows Explorer:** Viewing of files, Folders and its concern operations (Open, Copy, Move, Rename, Delete, Cut, Paste, Create Shortcut, Properties, Print), Searching for Files/Folders. **Windows Accessories** – Notepad, WordPad, Paint, Calculator, Use of Snipping Tool, Use of Sound Recorder, Windows Photo Gallery, Connect to Projector, Sticky Note. **Windows Control Panel:** Mouse, Fonts, Date/Time, Display, Printer, Manage User Accounts, Regional Settings, How to Add Languages, Folder Options, Task bar and Start Menu. Windows Trouble Shootings.	50%

Teaching-Learning Methodology	ICT through (e.g PowerPoint presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr.No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Basic Knowledge of Computer
2.	Fundamental of software and Hardware
3.	Use of computer in daily life

Suggested References:	
Sr. No	**References**
1.	Computercoursewindows7andoffice2010byR.K.TaxaliPublisherTata Mc Graw Hill.
2.	Computer fundamentals by Anita Goel Pearson Publication New Delhi.
3.	Sinha, P.K.(2003),"ComputerFundamentals",3thEd.,BPBPublications
4.	Rajarama, V, "Fundamentals of Computers", PHI

On-line resources to be used if available as reference material

On-line Resources On-line resources to be used as and when required

Course Code	**BV01AEAEC05**	Title of the Course	**Communication Skill– I**
Total Credits Of the Course	**01**	Hours per Week	**02**

Course Objectives:	1. Introduce themselves, describe person, place or situation 2. Structure sentences for variety of purposes 3. Make or respond to enquiries; raise queries as and when required 4. Write letters for specific purposes 5. Use modal auxiliaries efficaciously 6. 6. Communicate in Active and Passive Voice precisely

Course Content

Unit	**Description**	**Weightage *(%)**
1	**Introducing Business Communication** – Concepts, Definition & Attributes of Communication – Objectives Of business communication – Process of communication – Importance of effective communication in business	50%
2	**Business Etiquettes** – Concept & Importance – Etiquettes for : A) Meeting B) Telephone/Cell phone Conversation – Etiquettes at work place (internal-superiors, peers &subordinates) Etiquettes with stakeholders (external-Suppliers & customers)	50%

Teaching-Learning Methodology	Role Play, Discussion and Debate, Think Pair Share, Traditional classroom teaching as well as usage of ICT tools.

Evaluation Pattern

Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Introduce themselves, describe person, place or situation.
2.	Structure sentences for variety of purposes.
3.	Make or respond to enquiries; raise queries as and when required.
4.	Write letters for specific purposes
5.	Use modal auxiliaries efficaciously.
6.	Communicate in Active and Passive Voice precisely.

Suggested References:

Sr. No.	References
1.	Essentials of business communication –Rajendra pal & JS Korlahalli
2.	Developing Communication skills –Krishan mohan & Meera Benerji
3.	Effective Business Communication – Asha Kaul
4.	Communication Skills – Sanjay Kumar & Pushp Lata

Course Code	**BV01AESEC06**	Title of the Course	**Industrial Training – I**
Total Credits Of the Course	**15**	Hours per Week	**-**

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	– The students have to undergone for internship/ on the job training under any Concerned Organization in the areas of QP/NOS – A presentation as well as report has to prepared and presented for the viva-voce and submit it to the concerned faculty.	100%

Course Code	**BV01AEIKS07**	Title of the Course	**Indian Knowledge Systems**
Total Credits Of the Course	**02**	Hours per Week	**02**

Course Objective:	– The course will enable the student teachers to – Examine the concept of Bhartiya concept of spirituality and its various paths. – Examine the Bhartiya philosophy of life derived from Shashtr as (ancient scriptures) and its implications for the Bhartiya lifestyle. – Analyse the concept of Indian Knowledge Systems (IKS) and emphasize its importance in preserving and disseminating indigenous knowledge. – High light the contributions of IKS to the world, particularly in the fields of mathematics and astronomy. – Explore the Bhartiya wisdom related to life sciences. – StudythescienceofarchitectureinancientIndiawithreferencetosignificantsites. – Provide an over view of Ayurveda, including its concepts, branches, important books, and pioneers in the field. – ExploreBhartiyaliteratureandtheBhartiyatheoryofaestheticsandrasainvariousartforms.

Course Content

Unit	Description	Weightage *(%)
1.	**Spiritual Bharat and Introduction to IKS** – Bhartiya Concept of Spirituality : Gyaan Marg, Bhakti Marg, Karmmarg, Yog Marg – Bhartiya Spiritual Thinking Leading to Unity – Bhartiya Philosophy of Life Derived from Shashtras and its Implications for Bhartiy Life Style – Introduction to IKS and Its Importance – Introduction of Various Indian Knowledge Systems	50 %
2.	**Contribution of IKS to the World** – Bhartiya Contribution in Mathematics and Astronomy – Bhartiya Wisdom related to Life Science: Physics, Chemistry, Botany – Bhartiy Science of Architecture with reference to Lothal, Mohan Jo Daro, Dholavira, Temple Architecture – Ayurveda : Concept, Branches, Books and Pioneers – Bhartiya Literature and Bhartiy Theory of Aesthetics and Rasa	50 %

Teaching-Learning Methodology	Lecture-cum-discussion, Group Discussion, Presentations, Seminars, tutorials, Research Exercises

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/Practical Examination Internal Continuous Assessment in the form of Practical, Viva, voce, Quizzes, Seminars, Assignments, Attendance	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the diverse paths of spirituality in Bhartiya culture, including Gyaan Marg, Bhakti Marg, Karm Marg, and Yog Marg, and recognize their significance in individual and collective spiritual growth.
2.	EvaluatetheBhartiyaphilosophyoflifederivedfrom Shashtrasandanalyzeitsimplications for contemporary Bhartiya lifestyles, fostering a deeper understanding of the connection between spirituality and everyday life.
3.	Explain the concept of Indian Knowledge Systems (IKS) and recognize its importance n preserving and promoting indigenous knowledge, fostering a sense of cultural identity and pride.
4.	Demonstrate knowledge of various Indian knowledge systems, such as Ayurveda, Vedic sciences, Yoga, Vedanta, and Jyotish, and appreciate etheir contributions to human knowledge and well-being.
5.	Recognize and appreciate the significant contributions of IKS to the world, particularly in the fields of mathematics and astronomy, and understand their impact on modern scientific advancements.
6	Analyze the Bhartiya wisdom related to life sciences, including physics, chemistry, and botany, as described in ancient texts, and understand their relevance and potential applications in contemporary scientific research.
7	Identify and analyze the unique architectural features and principles of ancient Indiansites like Lothal, Mohenjo-daro, Dholavira, and temple architecture, understanding their cultural, historical, and spiritual significance.

Suggested References:

- Radhakrishnan,S.(1992).TheHinduViewofLife.HarperCollinsPublishers.
- Singh, A.P., & Yagnik, S.(Eds.).(2019). Indian Knowledge Systems: Understanding the Human Uniqueness. Springer.
- Frawley, D., &Ranade, S.(2001).Ayurveda, Nature's Medicine. Lotus Press.
- Lad, V., & Frawley, D.(1986).The Yoga of Herbs: An Ayurvedic Guide to Herbal Medicine. Lotus Press.
- Dasgupta,S.(1947).AHistory of Indian Philosophy. Cambridge University Press.
- Pollock, S. (2006). The Language of the Gods in the World of Men: Sanskrit, Culture, and Power in Premodern India. University of California Press.
- Sarma, K. V. (2008). Indian Astronomy: A Source-Based Approach. National Council of Education Research and Training.
- Narlikar,J.V.,&Padmanabhan,T.(Eds.).(2016).DevelopmentofPhysicsinIndia.Springer.
- Mahdihassan, S. (1982). Ancient Indian Botany: Its Bearing on Art and Literature. Deccan College Post-Graduate and Research Institute.

SABARMATI UNIVERSITY
BACHELOR OF VOCATIONAL STUDIES
SEMESTER II
Automobile Engineering
(B.VOC-AE)

Subject		Course No.	Subject Title	T/P	Credit			Exam Duration	Marking Scheme		
					T	P	T		Internal	External	Total
Discipline Specific Course Core(Major)	Core Course-1	BV02AEMAC01	Chassis body & Transmission	T/P	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV02AEMAC02	Instruments And Equipment	T/P	1	-	1	2	25/09	25/09	50/18
Minor	Minor Course	BV02AEMIC03	Automobile Vehicle Service	T/P	1	-	1	2	25/09	25/09	50/18
Multi-Disciplinary	Multi-Disciplinary	BV02AEMDC04	Computer Skill - II	T/P	1	-	1	2	25/09	25/09	50/18
Ability Enhancement Course		BV02AEAEC05	Communication Skill - II	T/P	1	-	1	2	25/09	25/09	50/18
Skill Enhancement Course/Internship/ Dissertation		BV02AESEC06	Industrial Training – II	P	-	**15**	**15**	4	-	600/216	600/216
IKS/Value Added Course (**Any One**)		BV02AEVAC07	Environmental Studies	T/P	2	0	2	2	25/09	25/09	50/18
		BV02AEVAC08	NCC-I	T/P	2	0	2	2	25/09	25/09	50/18
		BV02AEVAC09	NSS-I	T/P	2	0	2	2	25/09	25/09	50/18
		BV02AEVAC10	Yoga, Meditation & Fitness-I	T/P	2	0	2	2	25/09	25/09	50/18
Minimum Quantifying Credits					**7**	**15**	**22**				**900/324**

Course Code	**BV02AEMAC01**	Title of the Course	**Chassis body & Transmission**
Total Credits of the Course	01	Hours per Week	02

Course Objective:	The objective of the Chassis, Body & Transmission course for vocational programs is to provide students with in-depth understanding and practical skills in vehicle chassis construction, bodywork techniques, and transmission systems. Students will learn to diagnose, repair, and maintain these critical components, ensuring safe and efficient vehicle operation in automotive industries.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	**Introduction:** – Types of chassis layout with reference to power plant location and drive. – Vehicle frames – Types of frames – Two, Three, four wheelers & HV – general form & dimensions, materials, frame stresses, frame sections – cross members, proportions of channel sections – constructional details, loading points, sub frames, passenger car frames – X member type frame – Box section type frame, testing of frames, bending and torsion test – Effect of brake application of frame stresses, truck frames, defects. **Steering, suspension, brake system**: – requirements, front axle details & geometry – construction & working details of rack and pinion type steering – worm & nut with recirculating balls type steering – Concept and working of power steering (hydraulic & electronic) – Suspension systems requirements, independent and dependent suspension – front & rear suspension systems of the vehicle – Different type of brake system, conventional drum type brakes – disc brakes, self-energizing brakes & ABS – characteristics of brake fluid – Tyre selection, cross ply, radial tyres, tubeless tyres – their construction details – comparison & application, hotch-kiss drive	50%

	– torque-tube drive and radius rods – Propeller shaft, universal joints – Front wheel drive, Constant velocity joints – Differential principle – Construction details of differential unit	
2.	**Body Details:** – Standard design of a car body – general requirements of a car body – body materials – body surface- corrosion protection – body finishing components- bumpers – exterior strips, impact strips, glazing, door latches etc – Safety- active – passive Classification of bus bodies – Based on distance traveled – capacity of the bus and style & shape – Construction of conventional and integral type buses & comparison **Drivetrain and Final Drive** –Front-Wheel Drive (FWD) –Rear-Wheel Drive (RWD) –All-Wheel Drive (AWD) and Four-Wheel Drive (4WD) –Drive shafts and Axles –Differentials: Open, Limited Slip, Locking –Transfer Cases in 4WD Systems –Function and Types of Final Drives –Hypoid, Bevel, and Worm Gear Drives –Maintenance and Troubleshooting –Factors Affecting Drivetrain Performance –Techniques for Improving Efficiency –Impact of Drivetrain on Vehicle Dynamics and Handling	50%

Teaching-Learning Methodology	Teaching-learning methodologies for Chassis, Body & Transmission in vocational programs include theoretical lectures, practical demonstrations using chassis and transmission models, hands-on workshops for bodywork and assembly, case studies on vehicle dynamics, and field visits to automotive manufacturing or service facilities. Emphasis is on integrating theory with practical skills development for effective automotive maintenance and repair.

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Out comes: Having completed this course, the learner will be able to	
1.	Students will demonstrate proficiency in diagnosing, repairing, and maintaining vehicle chassis, bodywork, and transmission systems, adhering to industry standards and safety protocols.
2.	Students will develop the ability to perform structural repairs, assembly, and alignment tasks, ensuring the reliability, safety, and operational efficiency of automotive chassis and transmission components in diverse technical environments.

Suggested References:	
Sr.No	**References**
1.	Automotive Chassis: Engineering Principles- Jornsen Reimpell, Helmut Stoll,", Elsevier, 601.
2.	Motor Vehicles Newton- Steeds & Garrot, SAE International and Butterworth Heinemann, 601
3.	Steering Suspension and Tyres- Giles.J.G, Iliffe Book Co. London,1988.
4.	Automotive Chassis-Brakes, Steering and Suspension- Tim Gilles, Thomson Delmer Learning,605.

Course Code	**BV02AEMAC02**	Title of the Course	**Instruments And Equipment**
Total Credits of the Course	01	Hours per Week	02

Course Objective:	The objective of the Instruments and Equipment course for vocational programs is to equip students with the knowledge and practical skills required to operate, maintain, and troubleshoot various instruments and equipment used in industrial and technical environments. Students will learn to ensure accuracy, reliability, and safety in equipment operations through hands-on training and theoretical understanding.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Metrology and Instrumentation:** – Metrology- definition, objectives, and necessity – Precision measurement, limits fits and tolerances – Measuring instruments- classification, linear – Measurement- vernier caliper, micrometer, dial gauge – Angular measurement- combination set – Plain surface measurement- level surface gauge, surface plate – Instrumentation- modes of measurement- primary or direct – Secondary or indirect involving one translation – Territory- indirect measurement involving two conversions **Servicing Equipment**: – Garage, service station, tune-up – Specification and application of - air compressor – Hydraulic hoist, electro mechanical hoist – Jack (mechanical, hydraulic), car washer and automatic car washer – Grease dispenser, oil sprayer, tyre changer, wheel balance – Wheel aligner, use of vacuum gauge, compression gauge – Cam (dwell) angle and r.p.m. Tester, battery tester – Spark plug cleaner and tester, ignition timing light – Fuel injector tester, fuel consumption tester – Cylinder leakage tester, radiator tester – Exhaust gas analyzer, smoke meter, – On- board/ smart diagnostic tool	50%
2.	**Engine repair, measuring, testing and reconditioning equipment:** – Specification and use of- torque wrench – Pneumatic wrench, piston ring compressor and expander – Piston ring filer, groove cleaner, scrapers – Valve lifter and valve spring tester, inside & outside micrometer	50%

	– Dial micrometer, cylinder bore gauge – Cylinder boring machine and honing machine – Crankshaft and camshaft grinding machine – Connecting rod aligner, line boring machine, valve refacing – Valve seat cutting and grinding machine – Cylinder head refacing machine **Advanced Equipment and Emerging Technologies** – Overview of advanced instruments: MRI machines, electron microscopes, and 3D printers – Emerging technologies: IoT-enabled devices, smart sensors, and wearable technology – Integration of advanced equipment in modern applications – Case studies on the use of advanced equipment in healthcare, manufacturing, and research – Future trends and innovations in instruments and equipment – Familiarize with advanced instruments and their applications – Understand the impact of emerging technologies on instruments and equipment – Analyze case studies to learn practical applications – Explore future trends and anticipate innovations in the field	

Teaching-Learning Methodology	Teaching-learning methodologies for Instruments and Equipment in vocational programs include theoretical lectures on equipment principles, hands-on practical sessions for operation and maintenance, demonstrations of instrument calibration, case studies on equipment applications, and simulations of troubleshooting scenarios. Emphasis is on developing technical proficiency and problem-solving skills essential for industrial settings.

Evaluation Pattern

Sr.No	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Out comes: Having completed this course, the learner will be able to

1.	Students will demonstrate competence in effectively operating, maintaining, and calibrating a variety of instruments and equipment used in industrial settings, ensuring precision and reliability in measurements and processes.
2.	Students will develop the ability to diagnose and rectify equipment malfunctions promptly, enhancing productivity and safety in technical environments, thereby increasing their employability in relevant industries.

Suggested References:	
Sr. No	**References**
1.	Tune-up testing and performance – Ken Layne, Regents/Prentice Hall,1993
2.	Classroom Manual for Automotive Engine Performance- Douglas Vidler, Thomson/Delmar Learning, 603
3.	Today's Technician: Automotive Computer Systems- Donald Knowles, Jack Erjavec, Cengage

Course Code	**BV02AEMIC03**	Title of the Course	**Automobile Vehicle Service**
Total Credits of the Course	01	Hours per Week	02

Course Objective:	The objective of the Automobile Vehicle Service course for vocational programs is to impart practical knowledge and skills in servicing and maintaining automobiles. Students will learn diagnostic techniques, repair procedures, and preventive maintenance practices, preparing them for entry-level positions in automotive service centers with a focus on customer satisfaction and industry standards.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	**Automobile Chassis:** – Introduction to automobiles – their utility and classification – Main components of an automobile – their constructional details, functions and working – Various mechanisms and systems in an automobile – their working and possible causes of defects – Scheduled and preventive maintenance – Servicing washing and polishing of a vehicle. **Engine System:** – Automobile engine – Its main components, their construction and working – Types of engines – two stroke/ four stroke cycle – Petrol / diesel fuel. Engine cooling system – Lubrication system. Spark ignition system – Petrol fuel injection system, diesel fuel injection system – Engine oil change, oil filter replacement – Servicing of all engine system components	50%
2.	**Transmission System:** – Function and working of single and multi-plate clutches – Clutch pedal/lever adjustment. Servicing – testing and adjustment of clutch unit – Construction, function and working of a gearbox – Synchromesh types of gearbox – Manual shifting and automatic transmission – Troubles in gear box, rectifications and servicing	50%

	Steering System: – Function of steering system – Types of steering systems – Components of steering system- steering linkage, steering gear – Manual and power steering – Rack and pinion type power steering – Steering geometry and wheel alignment – Servicing and adjustments of steering system	

Teaching-Learning Methodology	Teaching-learning methodologies for Automobile Vehicle Service in vocational programs include theoretical lectures on vehicle systems and diagnostics, hands-on training in automotive workshops for repairs and maintenance, simulations of service scenarios, customer interaction exercises, and industry internships. Emphasis is on practical skills development and industry-relevant knowledge application in automotive servicing.

Evaluation Pattern

Sr.No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Out comes: Having completed this course, the learner will be able to

1.	Students will demonstrate proficiency in diagnosing and repairing automotive systems such as engines, brakes, and electrical components, ensuring adherence to industry standards and customer satisfaction.
2.	Students will develop the ability to perform routine maintenance tasks effectively, ensuring the safe and efficient operation of vehicles, thereby enhancing their employability in automotive service centers.

Suggested References:

Sr.No	References
1.	James D. Halderman, Chase D. Mitchell, Jr. “Automotive Engines – Theory and Servicing” by Pearson Publishers
2.	Jack Erjavec, “Automotive Technology- A Systems Approach” by Thomson Delmar Learning Publishers, Singapore
3.	S Srinivasan, “Automotive Mechanics” by McGraw Hill, New Delhi

Course Code	**BV02AEMDC04**	Title of the Course	**Computer Skill - II**
Total Credits of the Course	01	Hours per Week	02

Course Objective:	**1.** To develop computer skill in commerce students. **2.** Computer skill helps commerce students to meet the needs of modern business. **3.** Computer skilled students can efficiently use Information and Communication Technology as modern businesses are highly rely on it. **4.** Computer skill increase the chances of getting hired.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Introduction to Web** – **Internet** (Internet & WWW, Website Address and URL, Modes of Connecting Internet, Popular Web Browsers) – **Gmail** (Introduction to Gmail Window, Details of Compose dialog box fields- To, CC, BCC, Subject etc., Compose an e-mail, add attachment and add signature, How to add more than one recipients at a time) **Word Processing & Presentation Tools** – Introduction to Word Processing software, benefits of word processing software, examples of word processors – Working with documents: Basic operations, formatting text & paragraphs, using tables, shapes, inserting pictures, mail merge facility – Introduction to Presentation tools and their basic features – Working with presentation slide: creating, editing, formatting and previewing, inserting picture, clipart, shapes and chart, adding header, footer, animations and slide transitions ,Printing slide content	50%
2.	**Spreadsheets** – Introduction to Spreadsheets and Spreadsheet packages – Building Spreadsheets using formulas, conditional calculations – Built-in functions – Database Utilities : sorting, filtering, extracting – Creating charts – Working with External data – Data analysis using What-if analysis – Pivot table and Pivot chart **Basics of HTML** – Introduction to HTML, HTML tags, Structure of HTML document, – Text and Paragraph Formatting, ordered and unordered lists	50%

	– HTML tables – Designing HTML forms	

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Out comes: Having completed this course, the learner will be able to

1.	Basic knowledge of Internet, Power point, Excel & Word, HTML
2.	Use of computer in daily life

Suggested References:

Sr. No	References
1.	Computer course windows 7 and office 2010 by R.K. Taxali Publisher Tata Mc Graw Hill.
2.	Introduction to Internet and HTML scripting 2nd edition, Bhaumik Shroff
3.	Sinha, P.K.(2003),"Computer Fundamentals",3rd Ed.,BPB Publications

On-line resources to be used if available as reference material

On-line Resources

1. https://online.glyndwr.ac.uk/what-are-computer-applications/
2. https://informationq.com/application-and-types-of-computer-applications/
3. https://www.tutorialspoint.com/computer_fundamentals/computer_applications.htm

Course Code	**BV02AEAEC05**	Title of the Course	**Communication Skill - II**
Total Credits of the Course	01	Hours per Week	02

Course Objective:	The paper is designed to enhance the communicative skills of the students. It focuses on some theories and detailed tips to improve usage of language effectively Language.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Fundamental of Communication** – Meaning, Importance & Objectives – Principles of communication – Techniques of effective communication – Barriers of effective communication	50%
2.	**Types of Communication & Communication skills** – Written - Oral - Face-to-face - Silence - Merits and limitations of each type – Cross cultural dimensions of business communication technology and communication – Ethical & legal issues in Business communication	50%

	Practical The students are required to do Dictation, Narration, Listening Comprehension, Note Making/ Note Taking as given by concerned faculty	

Teaching-Learning Methodology	**Learner-centered Instructional methods** Direct method, quiz, assignments, interactive sessions, seminars, visual presentations, group discussions, project based learning and use of e-resources, including films

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / Practical Examination Internal Continuous Assessment in the form of Practical, Viva-voce,Quizzes, Seminars, Assignments, Attendance	50%
3.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	How to communicate professionally
2.	Etiquettes of communication
3.	Student learn how to correspondence

Suggested References:	
Sr. No	**References**
1.	Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi.
2.	Media and Communication Management - C. S. Rayudu - Himalaya Publishing House, Bombay.
3.	Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep
4.	Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal and Prof. Ravindra

On-line resources to be used as and when required

On-line Resources

- https://hbr.org/topic/subject/business-communication
- https://ddceutkal.ac.in/Syllabus/MA_English/Paper_21.pdf
- https://www.indeed.com/career-advice/career-development/importance-of-business-communication

Course Code	**BV02AESEC06**	Title of the Course	**Industrial Training – II**
Total Credits of the Course	15	Hours per Week	-

Course Objective:	1. The Purpose of this Course is to Enable the Students for In-Depth analysis of a topic relating to his/her area of Specialization 2. Develop and develop a comprehensive understanding on the same. For This the Students will Choose his/her faculty guide in his/her area of specialization and work on the topic jointly with the faculty. 3. The Students will Work on their projects individually and not in pairs or teams. 4. The Institute may help the student in selecting a faculty guide in case a student is not able to do so, or if a faculty member is chosen by too many students.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	– The students have to undergone for internship/ on the job training under any Concerned Organization in the areas of QP/NOS – A presentation as well as report has to prepared and presented for the viva-voce and submit it to the concerned faculty.	100%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce,Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Able to do Export Import
2.	Various loan arrangement for business
3.	Study of Secondary data from Books, Journal and magazine Articles, NewspaperArticles, Websites, Electronic & Physical Databases, Etc.
4	Primary Data Collection Through Interviews, Discussions & Other Research Instruments. Students are encouraged to Pursue the research in the organization where they had undergone their summer Internship.

Suggested References:	
Sr. No	**References**
1.	Understanding Global Trade by Elhanan Helpman
2.	The World that Trade Created by Kenneth Pomeranz
3.	Global Trade Policy: Questions and Answers by Pamela J. Smith
4.	Rethinking International Trade by Paul Krugman

On-line resources to be used if available as reference material

On-line Resources
1. https://services.india.gov.in/service/listing?cat_id=73&ln=en 2. https://www.dgft.gov.in/CP/ 3. https://www.eximbankindia.in/

Course Code	**BV02AEVAC07**	Title of the Course	**Environmental Studies**
Total Credits Of the Course	**02**	Hours per Week	**04**

Course Objectives:	The course will enable the student teachers to 1. To aware the students about Environmental effects on human beings 2. Natural resources and its Impact 3. Provide Information on Renewable resources

Course Content		
Unit	**Description**	**Weightage *(%)**
1	**Overview of Environmental Studies:** – Definition, – Scope, – Importance. – Renewable and Non Renewable Resources, – Equitable use of resources for sustainable lifestyles	50%
2	**Natural Resources and Associated Problems:** – Forest Resources, – Water Resources, – Mineral Resources, – Energy Resources, – Land Resources. – Role of Individual in conservation of Natural Resources Case Study on various resources	50%

Teaching-Learning Methodology	Lecture-cum-discussion, Group Discussion, Presentations, Seminars, tutorials, Research Exercises

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/Practical Examination	50%
2.	InternalContinuousAssessmentintheformofPractical,Viva-voce,Quizzes,Seminars,Assignments,Attendance	
3.	University Examination	50%

Course Out comes: Having completed this course, the learner will be able to	
1.	To know Equitable use of resources for sustainable lifestyles
2.	Significance of Environment
3.	Forest & Water Resources in India
4.	Role of Individual in conservation of Natural Resources

Suggested References:	
Sr. No.	**References**
1.	Social Learning in Environmental Management: Towards a Sustainable Future by Meg Keen, Valerie A. Brown, Rob Dyball
2.	Principles of Environmental Science by William P. Cunningham and Mary Ann Cunningham
3.	Principles of Environmental Science by William P. Cunningham and Mary Ann Cunningham
4.	Lad, V., & Frawley, D. (1986). The Yoga of Herbs: An Ayurvedic Guide to Herbal Medicine. Lotus Press.
5.	Environmental Studies From Crisis to Cure by R. Rajagopalan

Course Code	**BV02AEVAC08**	Title of the Course	**NCC-I**
Total Credits Of the Course	**02**	Hours per Week	**04**

Course Objective:	– Course Content Part (I) Theory – Course Content Part (II) Practical – Course Objectives: – Cadets will be able to: - Know about the history of NCC and Awareness of Nation. – Its organization and incentives of NCC for their career prospects.
	– Acquire knowledge of duties and conduct of NCC cadets – Understand about different NCC camps and their conducts.
	– Understand the concept of national integration and its importance. – Understand the concept of self-awareness and emotional intelligence.
	– Understand the concept of critical & creative thinking. – Understand the process of decision making & problem solving.
	– Understand the concept of team and its functioning. – Understand the concept and importance of Social service.

	Course Content Course Content Part (I) Theory	
Unit	**Description**	**Weightage *(%)**
1.	**Unit 1- NCC General & National Integration Awareness (NI).** – Incentives of NCC, Duties of NCC Cadet. NCC Camps: Types & Conduct. – National Integration: Importance & Necessity, Factors Affecting National Integration, Unity in Diversity & Role of NCC in Nation Building, Threats to National Security.	**25 %**
2.	**Unit 2- Personality Development & Military History**. – Intra & Interpersonal skills - Self-Awareness- &Analysis, Empathy, Critical & creative thinking, Decision making and problem solving. – Study Of Battles of Indo-Pak Wars 1965 & 1971, Acquire awareness about the basic weapon system in use in the Armed Forces.	**25 %**

Course Objectives:	– Course Content Part (I) Theory – Course Content Part (II) Practical – Course Objectives:
	— Understand that drill as the foundation for discipline and to command a group for common goal.
	— Understand the importance of a weapon its detailed safety precautions necessary for prevention of accidents.
	— Develop awareness about different types of terrain and how it is used in battle craft.
	— Develop the concept of various markings on the map and how they are co-related to the ground features.

	Course Content Course Content Part (II) Practical	
Unit	**Description**	**Weightage *(%)**
1.	**Unit 1. Drill, Weapon Training** – Foot Drill Dahiea, Bayne, Aage aur Piche Kadam Lena,Chal se Murdna, Tej Chal se Salute Karna, Tej Kadam Taal aur Tham, Tej Kadam Taal se Kadam Badalna. Teeno Teen se Ek File aur ek file se Teeno Teen Banana – Weapon Training Range procedure & Theory of group, Short Range firing.	**25 %**
2.	**Unit 2. Map Reading & Field Craft & Battle Craft** – Protractor Bearing and its conversion methods, Service protractor and its uses, Prismatic compass and its uses and GPS, Navigation by compass and GPS. – Field Craft & Battle Craft indications of landmarks and Targets, Intro, Definitions, Types of Ground, Indication of Landmarks, Methods of ident of targets, difficult targets.	**25 %**

Teaching-Learning Methodology	Classroom teaching and learning Ground –Based learning (Practical) Project-Based Learning Problem-Based Learning Inquiry-Based Learning Group Discussion. Collaborative Learning Ground work practical. Army Wing Camps Training.

Evaluation Pattern		
Sr.No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written	15%
2.	Internal Continuous Assessment in the form of Practical & Viva	15%
3.	External Examination Written	35%
4.	External Examination Practical & Viva	35%

Course Outcomes	
1.	After completing this course, the cadets will be able to: - Imbibe the conduct of NCC cadets.
2.	Respect the diversity of different Indian culture.
3.	Practice togetherness and empathy in all walks of their life.
4.	Do their own self-analysis and will work out to overcome their weakness for better performance in all aspects of life.
5.	Understand creative thinking & its components.
6.	Think divergently and will try to break functional fixedness.
7.	Make a team and will work together for achieving the common goals.
8.	Do the social services on different occasions.

Suggested References	
Sr. No.	**References**
1	NCC Hand Book
2	DG NCC App
3	NCC DG Pressy
4	NATIONAL CADET CORPS (S.GAUR)

On-line resources to be used if available as reference material
On-line Resources
https://indiancc.nic.in/ncc-general-elective-subject-course-design/

Course Code	**BV02AEVAC09**	Title of the Course	**NSS-I**
Total Credits Of the Course	**02**	Hours per Week	**04**

Course Objectives	1. Develop among students a Sense of Social and Civil Responsibility 2. Develop Competence required for group-living and Sharing of Responsibilities. 3. Development of the personality of students through Community Service. 4. Understand the Community in which they work. 5. To know the basis concept, Philosophy, objectives and various advisory Committees of NSS. 6. To understand the basic programs and activities of NSS.

Course Content		
Unit	**Description**	**Weightage (%)**
1.	**National Service Scheme :Introduction and Basic Concepts: (Theory)** – Introduction of National Service Scheme – History & Philosophy of NSS – Mission, Objective, Symbol, NSS Badge, Flag, NSS Songs and NSS Day – Maintenance of daily Record	**50%**
2.	**Activity based Programmes : (Practical)** – Various NSS Programmes, Activities and it's Aims. – Orientation of NSS volunteers. – Regular Activities, One Day Camp and Special Camp – Celebrations of important days recognized by united nations, Central Govt., State Govt.	**50%**

Teaching-Learning Methodology	• Lecture Method • Online Lectures • Group Discussion • Practical Activities

Evaluation Pattern		
Sr.No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written /Practical (Written 25% + Practical 25%)	**50%**
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance, Practical	
3.	University Examination (Written 25% + Practical 25%)	**50%**

Course Outcomes: Having Completed this course, the students will be able to	
1.	Familiar with the basic concept, Philosophy, objectives and various advisory Committees of NSS
2.	Understand the community in which they work.
3.	Understand themselves in relation to their community.
4.	Make them a sense of Social and Civil Responsibility
5.	Develop Competence required for group-living and Sharing of Responsibilities.
6.	Have development of the personality of them through Community Service.
7.	Understand the basic programmes and activities of NSS

Suggested References	
Sr.No	**References**
1.	NATIONAL SERVICE SCHEME MANUAL

On-line resources to be used if available as reference material
https://nss.gov.in

Course Code	**BV02AEVAC10**	Title of the Course	**Yoga, Meditation & Fitness -I**
Total Credits Of the Course	**02**	Hours per Week	**04**

Course Objectives	1. To maintain physical fitness and wellness among the students 2. To guide the students about the concept of health and happiness through Yoga 3. To guide the students about mental health 4. To prepare the students to maintain the mental and physical health 5. To guide the students to lead a happy life with Yoga and meditation

Course Content		
Unit	**Description**	**Weightage (%)**
1.	**Yog :- Introduction and Basic concepts:** Meaning, Definition, Importance and Types of Yog Origin and Development of Yog. Meaning, Concept, Steps and Importance of Ashthang Yog. How Yog is different from Physical exercise. Yog practice in daily life and its benefits. Benefits of Suryanamskar.	**50%**
2.	**A. Yog & Meditation for Fitness: (Practical & Theory)** – Music & Meditation, Omkar Mantra & Meditation, Benefits of Meditation **B. Practical Aspect: (Practical & Theory)** – Prayer, Suryanamskar with Mantra, Subtle Exercise – Pranayams: Anulom-Vilom, Bhramri Pranayam, 3SR Breathing Technique-practice and Benefits – Aasans with their names, Practical and Benefits: – Standing Position:Trikonasan, Tiryak Tadasan, Ardhchandrasan, Tadasan, Vrikshasan. – Sitting Position:Padmasan, Sukhasan, Vakrasan, Yogmudrasan, Ushtrasan, Paschhimotasan – Asana lying on the stomach: Bhujangasan, Dhanurasan, Makrasan, Balasan – Asana lying on the back: Markatasan Setubandhasan, Shalbhasan, Pavanmuktasan, Ardhhalasan. – Relaxation Position: Yog Nindra, Savasan	**50%**

Teaching-Learning Methodology	Teaching learning methodology: Student Centric teaching learning methodology with practical and theory sessions with demonstration, group discussion and practical sessions along with traditional methods of teaching.

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written [Written 25%+ Practical 25%]	50%
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance, Practical	
3.	University Examination[Written 25%+ Practical 25%]	50%

Course Outcomes:	
1.	Students will increase in concentration & will power through Yog & Meditation
2.	Students will learn how to lead a balanced life.
3.	Students will understand the basic body system, root of diseases and remedies from Yog
4.	Students will experience the positive change in their life with the practices of Yog.
5.	Students will receive the grand Yog story of India.

Suggested References	
Sr. No	**References**
1	Yoga Sukshma Vyayma by Dhirendra Brahmachari
2	Asana Pranayama Mudra Bandha by Swami Satyananda Saraswati. Publisher: Yoga Publication Trust, Munger, Bihar,I
3	Karma Yoga, Bhati Yoga, Raja Yoga, Jnana Yoga by Swami Vivekananda
4	Yoga Sutras of Patanjali by Swami Satyananda Saraswati. Publisher: Yoga Publication Trust, Munger, Bihar, India
5	Hatha Yoga by Swami Sivananda.Publisher: The Divine Life Society, Uttarakhand, India
6	Gheranda Samhita by Swami Nirjanananda Saraswati. Publisher: Yoga Publication Trust, Munger, Bihar, India
7	Essence of Yoga by Swami Shivananda Saraswati. Publisher: The Divine Life Society
8	Yoga and Kriya by Swami Shivaananda Saraswati. Publisher; Yoga Publication Trust, Munger, Bihar, India

On-line resources to be used if available as reference material
On-line Resources
http://lyu.ac.in/yoga/
http://www.whenlifeisgood.com/iyengar-yoga-home-practice-sequences-a-resource-page

SABARMATIUNIVERSITY
BACHELOR OF VOCATIONAL STUDIES
SEMESTER III
Automobile Engineering
(B.VOC-AE)

Subject		Course No.	Subject Title	T/P	Credit			Exam Duration	Marking Scheme		
					T	P	T		Internal	External	Total
Discipline Specific Course Core (Major)	Core Course-1	BV03AEMAC01	Spare Parts Operations Executive	T	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV03AEMAC02	Human Resource Management-I	T	1	-	1	2	25/09	25/09	50/18
	Core Course-3	BV03AEMAC03	Energy Source and Automobile	T	1	-	1	2	25/09	25/09	50/18
Multi-Disciplinary	Multi-Disciplinary	BV03AEMDC04	Internal Combustion Engines	T	1	-	1	2	25/09	25/09	50/18
Ability Enhancement Course		BV03AEAEC05	Soft Skills for Business	T	1	-	1	2	25/09	25/09	50/18
Skill Enhancement Course/Internship/ Dissertation		BV03AESEC06	Industrial Training– III	P	-	15	15	4	-	600/216	600/216
IKS/Value Added Course		BV03AEIKS07	Indian Knowledge System – II	T	2	0	2	2	25/09	25/09	50/18
Minimum Quantifying Credits					**7**	**15**	**22**		**150/54**	**750/270**	**900/324**

Course Code	**BV03AEMAC01**	Title of the Course	**Spare Parts Operations Executive**
Total Credits of the Course	01	Hours per Week	01

Course Objectives:	1. To develop comprehensive knowledge of spare parts inventory management, including forecasting, stocking, and documentation procedures. 2. To equip learners with skills to coordinate with OEMs, vendors, and distributors for timely procurement and supply of automotive spare parts. 3. To inculcate professional competencies in planning, teamwork, safety compliance, and customer-centric spare parts operations.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	**Manage Spare Parts Inventory** – PC1. use the relevant part catalogue to assess the proper part number required for a particular vehicle – PC2. forecast the requirements of spare parts/ auto components – PC3. place the spare parts order with the OEM/ relevant supplier – PC4. check and record the orders as per the spare parts requirement	25%
2.	**Work requirements:** – PC5. obtain guidance from appropriate people, where necessary – PC6. ensure work meets the agreed requirements – PC7. establish and agree on work requirements with appropriate people – PC8. manage time, materials and cost effectively	25%
3.	**Interact & communicate effectively** – PC9. work in ways that show respect for colleagues – PC10. carry out commitments made to colleagues – PC11. let colleagues know in good time if cannot carry out commitments, explaining the reasons – PC12. identify problems in working with colleagues and take the initiative to solve these problems	25%

4.	**Manage Spare Parts Inventory** – PC13. ensure proper manage of spare parts to reduce the dead stock by faster stock rotation – PC14. carry out regular checks to ensure that the spare parts are stocked at the designated place – PC15. provide accurate, up-to-date parts receipt and stock information to the seniors – PC16. minimize the risk of damage to the spare parts, storage	25%

Teaching Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation)Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	External Examination Written / MCQ &Viva-voce	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Manage spare parts inventory effectively by applying stock control techniques, documentation systems, and audit procedures.
2.	Liaise efficiently with OEMs, suppliers, and local vendors to ensure accurate and timely availability of spare parts.
3.	Demonstrate professional skills in planning, communication, teamwork, and maintaining a safe and secure workplace environment.

Suggested References:	
Sr.No.	**References**
1.	Monczka, R. M., Handfield, R. B., Giunipero, L. C., & Patterson, J. L. (2020). *Purchasing and supply chain management* (7th ed.). Cengage Learning.
2.	Wild, T. (2017). *Best practice in inventory management* (3rd ed.). Routledge.
3.	Jacobs, F. R., & Chase, R. B. (2021). *Operations and supply chain management* (16th ed.). McGraw-Hill Education

On-line resources to be used if available as reference material
On-line Resources – Automotive Skills Development Council (ASDC) – Qualification Packs & NOS https://asdc.org.in – National Skill Development Corporation (NSDC) https://nsdcindia.org – Society of Indian Automobile Manufacturers (SIAM) https://www.siam.in

Course Code	**BV03AEMAC02**	Title of the Course	**Human Resource Management-I**
Total Credits of the Course	01	Hours per Week	01

Course Objectives:	1. To understand Nature of Human Resource Management 2. How to do a planning for Human Resource Planning 3. To understand career planning Development 4. Learn Six sigma of Human Resource Management

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Nature & Scope of Human Resource Management** – Concept of Human Resource Management – Characteristics of Human Resource Management – Objectives of Human Resource Management – Importance of Human Resource Management – Scope of Human Resource Management – Functions of Human Resource Management – Evolution of the concept of Human Resource Management	50%
2.	**Career Planning and Development** – Meaning of Career Planning – Objectives of Career Planning – Process of Career Planning – Advantages and Limitation of Career Planning	50%

Teaching Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn Recruitment and Selection
2.	Understand Performance Management
3.	Develop Employee Relations
4.	Learn Employee Engagement

Suggested References:	
Sr.No.	**References**
1.	K. Aswathappa, "Human Resource Management – Text & Cases", Tata McGraw Hill, Companies, New Delhi, 7th Reprint 2008
2.	L. M. Prasad, "OrganisationalBehaviour", Sultan Chand and Sons, New Delhi, 4th Edition – Reprint 2008.
3.	P. Subba Rao, "Personnel and Human Resource Management – Text and Cases", Himalaya Publishing House, Mumbai, 5th Edition 2010.
4.	S. S. Khanka, "Human Resource Management- Text and Cases", Sultan Chand and Sons, New Delhi, First Edition – Reprint 2008.
5.	S. V. Ganakar and C. B. Mamoria, "Personnel Management: Text and Cases," Himalaya Publishing House, Mumbai, 28th Edition 2008.

On-line resources to be used if available as reference material
On-line Resources – https://ncert.nic.in/ncerts/l/lebs102.pdf – https://www.tutorialspoint.com/management_principles/management_principles_tutorial.pdf – https://d3bxy9euw4e147.cloudfront.net/oscmsprodcms/media/documents/PrinciplesofManagement-OP.pdf

Course Code	**BV03AEMIC03**	Title of the Course	**Energy Source and Automobile**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Student should have studied subjects such as Physics, General Science and Elements of automobile engineering. 2. This subject provides knowledge of different energy sources used in internal combustion engines. 3. The objective of this subject is to make the student understand the phenomenon of combustion with fossil fuels, air requirement and different engine performance parameters.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Energy Sources:** – Different forms of energy – Classification of energy resources- commercial- non commercial – Renewable- non renewable – Conventional- non conventional – Availability of conventional energy resources – Classification of non conventional energy resources.	50%
2.	**Hydrocarbon Fuels:** – Origin of petroleum, its chemistry, refining of petroleum: fractional distillation, cracking, reforming process. – Properties and tests: Specific Gravity, viscosity, flash and fire points, calorific value, rating of fuels- cetane, octane number, cloud and pour point. – Properties and rating of fuels, lead free gasoline's, low and ultra – low sulphur diesels, LPG, CNG, Alcohols, Gaseous Fuel Injections, Dual Fueling and Controls – CNG and Gasoline, Hydrogen and Diesel, Alcohols and Diesels etc. – determination of theoretical minimum quantity of air for complete combustion. Determination of air fuel ratio for a given fuel. **Bio fuels:** – need and necessity, types, advantages. – Process of using – blending of biofuels with hydrocarbon fuels. – Fuel properties of biogas, fuel properties of biomass. Fuel cells	50%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	The student after studying this subject should be able to plan the transportation and should be able to design the roads or pathways accordingly.

Suggested References:	
Sr. No.	**References**
1.	Fundamentals of I.C. Engines - J.B. Heywood, McGraw Hill International Edition
2.	I.C. Engine - Maleev& Litchy, Mc GrawHill
3.	Modern Petrol Engine - A.W. Judge, B.I. Publications. 1983
4.	Automobile Engineering Vol. II - Kirpal Singh, Standard publications, New Delhi,605

On-line resources to be used if available as reference material

On-line Resources

- https://jipsindia.com/courses/baccalaureate-of-vocation-b-voc/
- https://aiecet.com/b-voc-automotive-manufacturing-technology-course-syllabus.php
- https://bvoc.kalingauniversity.ac.in/automobile/

Course Code	**BV03AEMDC04**	Title of the Course	**Internal Combustion Engines**
Total Credits of the Course	**01**	Hours per Week	**01**

Course Objectives:	1. Student should have studied subjects such as General Science, Physics, Mathematics and have the basic knowledge about different engineering materials being used in daily life to have an enhanced exposure. 2. This subject provides knowledge about the different molecular structures, properties of engineering material and their effect on the strength and behavior of solids under load.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Operation fundamentals** – Working principles of IC engines – classification-SI – CI engine – 2 stroke, 4 stroke – I C engine components – Constructional details and working. **Engine system** – Cooling system – Lubrication – Fuel supply – Valve operation and valve timing – Ignition system	50%
2.	**Fuel and combustion** – SI Engine- fuels – Fuel mixture preparation – Fuel combustion process – Normal and abnormal combustion – Products of combustion, pollutants – CI engines- fuels – Fuel injection system – Fuel combustion process normal and abnormal combustion – Products of combustion, – Pollutants	50%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance.	
3.	External Examination	50%

Course Out comes: Having completed this course, the learner will be able to develop	
1.	This knowledge will be helpful to the student in co-relating molecular structures with the properties of the solid materials and the ways to enhance the properties of the materials, understanding and solving the various engineering problems.

Suggested References:	
Sr. No.	**References**
1.	Fundamentals of I.C. Engines - J.B. Heywood, McGraw Hill International Edition
2.	I.C. Engine - Maleev& Litchy, Mc GrawHill
3.	Modern Petrol Engine - A.W. Judge, B.I. Publications.1983
4.	Automobile Engineering – Anil Chhikara, Satya Prakashan, Delhi [R4] I.C Engines and Air Pollution by Obert.

On-line resources to be used as and when required

On-line Resources

- MIT Open Course Ware – Internal Combustion Engines https://ocw.mit.edu/courses/mechanical-engineering/2-65-internal-combustion-engines-spring-2013/
- Khan Academy – Thermodynamics & Engines https://www.khanacademy.org/science/physics/thermodynamics
- SAE International – Engine Technology Resources https://www.sae.org/learn/engine-technology

Course Code	**BV03AEAEC05**	Title of the Course	**Soft Skills for Business**
Total Credits of the Course	**01**	Hours per Week	**01**

Course Objectives:	• The paper is designed to enhance the communicative skills of the students. • It focuses on some theories and detailed tips to improve usage of language effectively Language.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Interview Techniques** – Importance – Types of Interview – Art of conducting and giving interviews – Interview Skills – Corporate readiness	50%
2.	**Communication skills** – Significance, – Process &Forms of communication – Communication gap Listening skills, basics of managerial speaking skills Body language- how to develop matter for a speech Effective use of presentation aids' – Preparation of Resume & CV – GD & Interview	50%
Teaching-Learning Methodology	Learner-centered Instructional methods Direct method, quiz, assignments, interactive sessions, seminars, visual presentations, group discussions, project based learning and use of e-resources, including films	

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance.	
3.	External Examination	50%

Course Out comes: Having completed this course, the learner will be able to develop	
1.	How to communicate professionally
2.	Understand Interview Techniques
3.	Student learn how to correspondence

Suggested References:	
Sr.No.	**References**
1.	Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi.
2.	Media and Communication Management - C. S. Rayudu - Himalaya Publishing House,Bombay.
3.	Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep
4.	Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal and Prof. Ravindra

On-line resources to be used as and when required
On-line Resources • **https://hbr.org/topic/subject/business-communication** • **https://ddceutkal.ac.in/Syllabus/MA_English/Paper_21.pdf** • **https://www.indeed.com/career-advice/career-development/importance-ofbusinesscommunication**

Course Code	**BV03AESEC06**	Title of the Course	**Industrial Training– III**
Total Credits of the Course	**15**	Hours per Week	**30**

Course Objectives:	1. The Purpose of this Course is to Enable the Students for In-Depth analysis of a topic relating to his/her area of Specialization 2. Develop and develop a comprehensive understanding on the same. For This the Students will Choose his/her faculty guide in his/her area of specialization and work on the topic jointly with the faculty. 3. The Students will Work on their projects individually and not in pairs or teams. 4. The Institute may help the student in selecting a faculty guide in case a student is not able to do so, or if a faculty member is chosen by too many students.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	• The students have to undergone for internship/ on the job training under any Concerned Organization in the areas of QP/NOS • A presentation as well as report has to prepared and presented for the viva-voce and submit it to the concerned faculty.	100%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	External Examination in the form of Practical ,Viva-voce and Reports	100%

Course Out comes: Having completed this course, the learner will be able to develop	
1.	Create project Report
2.	Enhance the confidence for future aspects

Suggested References:	
Sr.No.	**References**
1.	"Designing Effective Instruction" by Gary R. Morrison, Steven M. Ross, Jerrold E.Kemp, Howard K. Kalman
2.	"Training and Development for Dummies" by Elaine Biech
3.	"Effective On-the-job Training: Developing an OJT Program" by Joseph A. Benkowski

On-line resources to be used as and when required
On-line Resources • **https://www.simplilearn.com/how-to-create-a-project-reportarticle**

Course Code	**BV03AEIKS07**	Title of the Course	**Indian Knowledge System – II**
Total Credits of the Course	**02**	Hours per Week	**02**

Course Objectives:	– The course will enable the learners to… – To analyse the etymology and meaning of the word "Dharma" and its significance in various cultures and religions. – To explore the characteristics of Dharma and how it manifests in different contexts. – To examine the explanations of the concept of Dharma by renowned scholars and thinkers throughout history. – To recognize the importance of Dharma in shaping human life, ethics, and societal values. – To identify the different forms of Dharma present in contemporary society and specifically in the context of Kaliyug (the current age according to Hindu cosmology). – To appreciate the significance of Aacharn dharma (ethical conduct and righteous behavior) in upholding Dharma. – To analyze examples of various characteristics of Dharma in the lives of notable scholars, philosophers, and religious figures. – To introduce and gain an overview of the major Dharma shastras (ancient Indian texts that discuss laws, duties, and ethical principles). – To foster critical thinking and open discussion regarding the interpretation and application of Dharma in modern times. – To develop deeper understanding of the cultural, ethical, and spiritual dimensions of Dharma and its relevance in contemporary society.

Course Content

Unit	Description	Weightage *(%)
1.	**Introduction of Dharma** 1. Etymology and meaning of the word Dharma. 2. Characteristics of word Dharma. 3. Explanation of the word Dharma by great scholars. 4. The importance of Dharmainhumanlife.	50%
2.	**Importance of Dharma Shastras** 1. Forms of Dharma at present and kaliyug. 2. Importance of Aacharn dharma. 3. Examples of various characteristics of Dharma in the life of scholars. 4. Introduction to the major Dharma shastras	50%

Teaching-Learning Methodology	**Learner-centered Instructional methods** Direct method, quiz, assignments, interactive sessions, seminars, visual presentations, group discussions, project based learning and use of e-resources, including films

Evaluation Pattern		
Sr. No	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance.	
3.	External Examination	50%

Course Out comes: Having completed this course, the learner will be able to develop	
1.	Identify the historical and cultural context of the word "Dharma" and explain its etymology and core meaning.
2.	Analyze the characteristics of Dharma and its manifestations in various aspects of human life, including personal ethics, social responsibilities, and spiritual practices.
3.	Evaluate the explanations of Dharma provided by eminent scholars and thinkers, and critically examine different perspectives on its interpretation and application.
4.	Recognize the importance of Dharma in guiding ethical decision-making, promoting harmony in relationships and communities, and fostering a just and compassionate society.
5.	Apply the concepts of Dharma to contemporary issues and challenges, demonstrating an understanding of the different forms of Dharma in present times, the significance of Aacharndharma, and the in fluence of Dharma in the lives of scholars and individuals who exemplify its principles.

References

"Dharma: Its Early History in Law, Religion and Narrative" by Alf Hiltebeitel

"Dharma: The Hindu, Jain, Buddhist and Sikh Traditions of India "by Veena R. Howard." The Concept of Dharma in Valmiki Ramayana" by Dr. Nityanand Mishra

"Dharma in Hinduism: A Historical and Philosophical Perspective" by Arvind Sharma

"Dharma and Ecology of Hindu Communities: Sustenance and Sustainability" edited by Pankaj Jain

"Understanding Dharma: The Four Authentic Sources" by Pradip Gangopadhyay

SABARMATI UNIVERSITY
BACHELOR OF VOCATIONAL STUDIES
SEMESTER IV
Automobile Engineering
(B.VOC-AE)

Subject		Course No.	Subject Title	T/P	Credit			Exam Duration	Marking Scheme		
					T	P	T		Internal	External	Total
Discipline Specific Course Core (Major)	Core Course-1	BV04AEMAC01	Electric Vehicle Service Lead Technician	T	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV04AEMAC02	Automotive Electricals & Electronic System	T	1	-	1	2	25/09	25/09	50/18
	Core Course-3	BV04AEMAC03	Human Resource Management-II	T	1	-	1	2	25/09	25/09	50/18
Minor	Minor Course	BV04AEMIC04	Tyre Technology	T	1	-	1	2	25/09	25/09	50/18
Ability Enhancement Course		BV04AEAEC05	Critical & Logical Thinking	T	1	-	1	2	25/09	25/09	50/18
Skill Enhancement Course/Internship/Dissertation		BV04AESEC06	Industrial Training– IV	P	-	16	16	4	-	650/234	650/234
VAC		BV04AEVAC07	Yoga, Meditation & Fitness -II	T	1	-	1	2	25/09	25/09	50/18
Minimum Quantifying Credits					**6**	**16**	**22**		**150/54**	**800/288**	**950/342**

Course Code	**BV04AEMAC01**	Title of the Course	**Electric Vehicle Service Lead Technician**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. To develop comprehensive knowledge and practical skills in diagnosing, servicing, and repairing mechanical, electrical, and electronic systems of electric vehicles (EVs). 2. To equip learners with competencies in handling high-voltage (HV) systems safely, following OEM Standard Operating Procedures (SOPs) and Occupational Safety and Health (OSH) guidelines. 3. To enable students to manage workshop operations effectively, ensure quality standards, and lead service teams in EV maintenance and repair environments.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Maintain safe and secure working environment:** – PC1. ensure that the team complies with organization's health, safety, security policies and procedures – PC2. identify the risks and hazards associated with work activities, their causes and prevention asper organisation's policy – PC3. encourage team to report any identified breaches in health, safety, and security policies and procedures to the designated person. – PC4. ensure work area is kept clean and tidy	25%
2.	**Organization and Management:** – PC5. identify individual work requirements and provide necessary instructions to the team – PC6. ensure the team works as per the assigned and agreed requirements – PC7. identify work which fails the requirements, specified quality standards and ensure timely corrective action is taken – PC8. implement ways and guide the team to manage time, resources and cost effectively	25%
3.	**Material/energy/electricity conservation practices** – PC9. identify recyclable, non-recyclable and hazardous waste generated – PC10. ensure the team segregates waste into different categories – PC11. ensure proper disposal of non-recyclable waste – PC12. ensure recyclable and reusable material is deposited at identified location	25%

4.	**Ensure a healthy and hygienic workplace** – PC22. ensure workplace, equipment, restrooms etc. are sanitized regularly – PC23. promote awareness about hygiene and sanitation regulations – PC24. check availability of running water, hand wash and alcohol-based sanitizers at workplace – PC25. support employees to cope with stress, anxiety etc	25%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	External Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Diagnose faults in electric vehicles using appropriate diagnostic tools, SOPs, and manufacturer specifications, and propose suitable repair solutions.
2.	Perform servicing, repair, and overhauling of EV mechanical aggregates and electrical/electronic systems, including HV components, in compliance with safety regulations.
3.	Supervise workshop operations, implement resource optimization practices, ensure waste management compliance, and maintain professional documentation and customer interaction standards

Suggested References:	
Sr. No.	**References**
1.	Ehsani, M., Gao, Y., Longo, S., & Ebrahimi, K. (2018). *Modern electric, hybrid electric, and fuel cell vehicles: Fundamentals, theory, and design* (3rd ed.). CRC Press.
2.	Husain, I. (2011). *Electric and hybrid vehicles: Design fundamentals* (2nd ed.). CRC Press.
3.	Larminie, J., & Lowry, J. (2012). *Electric vehicle technology explained* (2nd ed.). John Wiley & Sons

On-line resources to be used if available as reference material

On-line Resources
• Automotive Skills Development Council (ASDC) – Qualification Packs & NOShttps://asdc.org.in. • National Skill Development Corporation (NSDC) – Automotive Sector Skill Resourceshttps://nsdcindia.org. • Society of Automotive Engineers (SAE) International – EV Technical Papers & Standardshttps://www.sae.org.

Course Code	**BV04AEMAC02**	Title of the Course	**Automotive Electricals & Electronic System**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Student should have studied subjects such as General Science, Physics, mathematics and have the basic knowledge about automobile engineering to have an enhanced exposure. 2. This subject provides knowledge about the different electrical and electronic components in automobiles.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Storage Battery** – Principle of lead acid cells, – Plates and their characteristics containers and separators, – Electrolyte and their preparation, – Voltmeter, – Effect of temperature on electrolyte, specific gravity, – Capacity and efficiency, – Methods of charging from D.C. mains, – Defects and remedies of batteries, – Care of idle and new batteries. – Recent development in batteries	50%
2.	**Generator/ Alternator** – Principle of generation of direct current, – AC generator details, – DC generator, Charging circuit, – voltage and current regulators, – cutout -construction, – working and adjustment. **Starter Motor & Drives** – Battery motor starting system, – Condition at starting, behavior of starter during starting, – Series motor and its characteristics, – Consideration affecting size of motor, – Types of drives, starting circuit.	50%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to

1.	This knowledge will be helpful to the student in co-relating molecular structures with the properties of the solid materials and the ways to enhance the properties of the materials
2.	Understanding and solving the various engineering problems.

Suggested References:

Sr.No.	References
1.	Heinz Heisler, “Advanced Engine Technology”, SAE Publications, 1995.
2.	Ulrich Adler, “Automotive Electronic Systems”, Robert Bosch, GMBH,1995
3.	A.P. Young & Griffiths, “Automobile Electrical Equipment”, ELBS &NewnesButterworths,London.
4.	A.W. Judge, “Modern Electrical Equipment-Motor Manuals”, Vol.6, Chapman &HallLtd.
5.	Parker and Smith S., “Electrical Equipment for Automobiles”, Chapman & Hall Ltd.1927

On-line resources to be used if available as reference material

On-line Resources

- https://www.studocu.com/in/document/visvesvaraya-technological-university/electronic-and-communication/automotive-electronics-notes/22273637
- https://automotivetraining.info/online-course/electricity-electronics

Course Code	**BV04AEMAC03**	Title of the Course	**Human Resource Management-II**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. To understand about performance appraisal and compensation 2. How to maintaining and retaining of Human Resources? 3. To know about industrial relations and industrial disputes. 4. Learn about occupational Health and Safety related to employees

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Performance Appraisal:** • Concept of Performance Appraisal • Objectives of Performance Appraisal • Importance of Performance Appraisal • Techniques of Performance Appraisal) A) MBO B) BARS a)Checklist b) Paired Comparison • Limitations of Performance Appraisal **Compensation:** • Concept of Compensation • Types of Compensation • Factors affecting Compensation	50%
2.	**Maintaining and Retaining Human Resources Promotion:** • Concept & Basis for Promotion • Promotion Policy **Transfer:** • Concept of Transfer • Need & Objectives of Transfer • Types of Transfer Transfer Policy	50%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written/MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva -voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Evaluate the performance of employees systematically.
2.	Analyse, interpret and satisfy the needs of the employees.
3.	Understand &Analyse, interpret and satisfy the needs of the employees.
4	Understand the significance Occupational hazards and diseases.

Suggested References:	
Sr. No.	**References**
1.	InternaK. Aswathappa, "Human Resource Management – Text & Cases", Tata McGraw Hill, Companies, New Delhi, 7th Reprint 2008.
2.	L. M. Prasad, "Organisational Behaviour", Sultan Chand and Sons, New Delhi, 4th Edition – Reprint 2008.
3.	P. Subba Rao, "Personnel and Human Resource Management – Text and Cases", Himalaya Publishing House, Mumbai, 5th Edition 2010.
4.	S. S. Khanka, "Human Resource Management- Text and Cases", Sultan Chand and Sons, New Delhi, First Edition – Reprint 2008.
5.	S. V. Ganakar and C. B. Mamoria, "Personnel Management: Text and Cases," Himalaya Publishing House, Mumbai, 28th Edition 2008.
6.	Vikas Arora & Seema Arora, " Human Resource Management", Global Vision Publishing House, New Delhi, First Edition – 2011.

On-line Resources
On-line resources to be used if available as reference material
1. https://www.compensationresources.com/performance-management/ 2. https://www.udemy.com/course/performance-management-and-compensation-management-in-hrm/?couponCode=ST2MT43024 3. https://www.maritimeknowledge.in/course details.php?course_id=168&course_name=HumanResourceManagement# 4. https://hrylabour.gov.in/staticdocs/labourActpdfdocs/THE_INDUSTRIAL_DISPUTE_RULES.pdf 5. https://labour.gov.in/sites/default/files/the_industrial_disputes_central_rules1957.pdf 6. https://pria-academy.org/pluginfile.php/557/mod_resource/content/1/Unit_1_-_Introduction_to_Occupational_Health_and_Safety.pdf 7. https://cpri.res.in/sites/default/files/PCB/OSHA%20MANUAL%20of%20Occupational%20health%20and%20safety%20Summary%20.pdf

Course Code	**BV04AEMIC04**	Title of the Course	**Tyre Technology**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. The main objective of this subject is to make the student able to understand importance of tyre in an automobile. 2. The pre requisites for this are that he/she should have the basic study of organic chemistry, basic automobile and manufacturing technology.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Introduction :** – Importance of tyres, history, – Current status, – Functions of pneumatic tyres, applications, – Types of tyres, desirable tyre properties, – Classification of tyres based on carcass, – Tyre profile, geometry, sizing & designation, – Tyre components, – Principle of pneumatic tyre, – Requirements of pneumatic tyres.	50%
2.	**Manufacture Technology:** – General introduction, – Role of various mixing ingredients, various recipes. – Compound mixing, mixing equipments, – Extrusion of components, – Tyre cord, wire cord manufacture, – Calendaring tyre manufacture, – Mold procurement, component preparation, – Green tyre building, – Pre curing, curing and post curing operations/treatments.	50%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	The student will be able to get a respectable position in tyre industry and can be suitably self-employed.
2.	Identify tyre specifications, markings, load index, and speed ratings.
3.	Explain the construction, components, and types of tyres used in different vehicles.

Suggested References:	
Sr.No.	**References**
1.	Pneumatic Tyre Design- E.C. Wood,Cambridge
2.	Tire Engineering- Kovac & Rodgers, Goodyear Tire Rubber Co., Ohio
3.	Handbook of Rubber Technology, R. Schuster, Wiley Interscience

On-line resources to be used if available as reference material

On-line Resources

- https://www.slideshare.net/sajaysyadavs/tyres
- https://www.automotive-technology.com/articles/tyres
- https://bvoc.kalingauniversity.ac.in/wp-content/uploads/2023/05/Syllabus-Automobile.pdf#page=1

Course Code	**BV04AEAEC05**	Title of the Course	**Critical & Logical Thinking**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. To understand the principles underlying coding-decoding techniques used to encrypt and decrypt information. 2. To Analyze Data Using Column Charts and Bar Charts & Pie Charts.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**LOGICAL REASONING** • Simple Analogy; Pattern and Series of Numbers • Letters, Figures • Coding-Decoding of Numbers • Letters, Symbols (Figures)	50%
2.	**Data Analysis & interpretation** • Tables • Column Charts • Bar Charts • Line Charts • Pie Chart	50%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written/MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva -voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Analyze Coding-Decoding of Letters, Symbols.
2.	Develop the ability to identify correlations, fluctuations, and outliers in time-series data through graphical representation.

Suggested References:	
Sr. No.	**References**
1.	A Modern Approach To Verbal & Non Verbal Reasoning By R S Agarwal
2.	Analytical and Logical reasoning By Sijwali B S
3.	Quantitative aptitude for Competitive examination By R S Agarwal
4.	Analytical and Logical reasoning for CAT and other management entrance test By Sijwali B S
5.	Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th edition

On-line resources to be used if available as reference material

On-line Resources
1. https://prepinsta.com/
2. https://www.indiabix.com/
3. https://www.javatpoint.com/

Course Code	**BV04AESEC06**	Title of the Course	**Industrial Training– IV**
Total Credits of the Course	16	Hours per Week	36

Course Objective:	1. The Purpose of this Course is to Enable the Students for In-Depth analysis of a topic relating to his/her area of Specialization 2. Develop and develop a comprehensive understanding on the same. For This the Students will Choose his/her faculty guide in his/her area of specialization and work on the topic jointly with the faculty. 3. The Students will Work on their projects individually and not in pairs or teams. 4 . The Institute may help the student in selecting a faculty guide in case a student is not able to do so, or if a faculty member is chosen by too many students.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	• The students have to undergone for internship/ on the job training under any Concerned Organization in the areas of QP/NOS • A presentation as well as report has to prepared and presented for the viva-voce and submit it to the concerned faculty.	100%

Teaching-Learning Methodology	ICT through (e.g Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	External Examination in the form of Practical ,Viva-voce and Reports	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Create project Report
2.	Enhance the confidence for future aspects

Suggested References:	
Sr. No.	**References**
1.	"Designing Effective Instruction" by Gary R. Morrison, Steven M. Ross, Jerrold E. Kemp, Howard K. Kalman
2.	"Training and Development for Dummies" by Elaine Biech
3.	"Effective On-the-job Training: Developing an OJT Program" by JosephA. Benkowski

On-line resources to be used if available as reference material

On-line Resources
1. https://www.simplilearn.com/how-to-create-a-project-reportarticle

Course Code	**BV04AEVAC07**	Title of the Course	**Yoga, Meditation & Fitness**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	• To develop physical fitness, flexibility, and overall body strength through yoga practices.
	• To promote mental relaxation, concentration, and emotional balance through meditation techniques.
	• To create awareness about healthy lifestyle habits and the importance of regular physical activity.
	• To enhance self-discipline, stress management, and inner well-being.
	• To encourage holistic development by integrating body, mind, and breath coordination.

Course Content Course Content Part (I) Theory		
Unit	**Description**	**Weightage *(%)**
1.	**Home Nursing** – Introduction, Quality of a nurse, Duties of nurse, Common Nursing Instrument – Sick Room, observation of the sick , Signs and symptoms to be noted, Taking pules, Respiration & Temperature – Relationship between temp Pulse and respiraion , Setting of blood pressure apparatus	50%
2.	**YOGASANS** – Advantage from asanas-1, – Hints for successful yogasanas, – Types of yogasanas, – Madiativeasanas , – Physical asanas.	50%

Teaching-Learning Methodology	Classroom teaching and learning Ground –Based learning (Practical) Project-Based Learning Problem-Based Learning Inquiry-Based Learning Group Discussion. Collaborative Learning Ground work practical. Army Wing Camps Taring.

Evaluation Pattern		
Sr.No.	**Details of the Evaluation**	**Weightage**
1.	Internal Written/MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva -voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	After completing this course, the cadets will be able to: - Imbibe the conduct of NCC cadets.
2.	Respect the diversity of different Indian culture.
3.	Practice togetherness and empathy in all walks of their life.
4.	Do their own self-analysis and will work out to overcome their weakness for better performance in all aspects of life
5.	Understand creative thinking & its components.
6.	Think divergently and will try to break functional fixedness.
7.	Make a team and will work together for achieving the common goals.
8.	Do the social services on different occasions.

On-line resources to be used if available as reference material

On-line Resources
On-line Resources https://indiancc.nic.in/ncc-general-elective-subject-course-design/

SABARMATIUNIVERSITY
BACHELOR OF VOCATIONAL STUDIES
SEMESTER V
Automobile Engineering
(B.VOC-AE)

Subject		Course No.	Subject Title	T/P	Credit			Exam Duration	Marking Scheme		
					T	P	T		Internal	External	Total
Discipline Specific Course Core (Major)	Core Course-1	BV05AEMAC01	Product Conceptualization Engineer	T	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV05AEMAC02	Tractors farm equipment and Off road vehicles	T	1	-	1	2	25/09	25/09	50/18
	Core Course-3	BV05AEMAC03	Vehicle Body Engineering	T	1	-	1	2	25/09	25/09	50/18
Minor	Core Course-1	BV05AEMIC04	Element of noise, vibration and Harmless Control	T	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV05AEMIC05	Corrosion prevention and Vehicle body paint technology	T	2	-	1	2	25/09	25/09	50/18
Skill Enhancement Course/Internship/ Dissertation		BV05AESEC06	Industrial Training – V	P	-	16	16	4	-	650/234	650/234
Minimum Quantifying Credits					**6**	**16**	**22**		**125/45**	**775/279**	**900/324**

Course Code	**BV05AEMAC01**	Title of the Course	**Product Conceptualization Engineer**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. To develop the ability to conceptualize innovative automotive products based on customer requirements, market trends, and technical feasibility. 2. To equip students with analytical tools for benchmarking, trend analysis, sensitivity analysis, and SQFD (Simplified Quality Function Definition). 3. To enable understanding of regulatory, environmental, and safety compliance in product conceptualization

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**UnderstandingCustomer Needs** – PC1. Understand and determine the customer preferences – PC2. Make sure to capture verbatim of the customer's comment/ expectations on the proposed product – PC3. Evaluate the user/ customer needs – PC4. Clarify understanding pertaining to specification, parameter, constraints on the product design in consultation with the relevant stakeholders	25%
2.	**Supporting the manager in initial stage of ideageneration** – PC5. Understand the customer requirements, prioritization and requirement classification – PC6. Understand the relationship between customer needs and satisfaction – PC7. Support in development of a range of criteria against which to evaluate different options and ideas – PC8. Support in conceptualizing and developing the product on the basis of 'one dimensional attributes', 'indifferent attributes', 'attractive attributes and 'must be attributes'	25%

3.	**Preparing basic level of product layout** – PC9. Creation a freehand sketch/ silhouette of the conceptual design – PC10. Using mechanical CAD (Computer Aided Design) system support in generating the basic freehand layout design geometry – PC11. Creation of tape drawing on package plan a 1:1 scale that includes all technical and structural constituents	25%
4.	**Sensitivity analysis** – PC17. Identify the range of the parameters that is realistically possible – PC18. Design and conduct experiment to check for sensitivity – PC19. Summarize the results for further analysis – PC20. Calculate values of sensitivity index for each of the parts	25%

Teaching-Learning Methodology	ICT through(e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage**
1.	External Examination	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Apply analytical and decision-making tools to generate and evaluate product concepts aligned with customer needs and market trends.
2.	Conduct internal and external benchmarking, economic and technology trend analysis for automotive product development.
3.	Ensure regulatory, environmental, and safety compliance while supporting cross-functional teams in product conceptualization.

Suggested References:	
Sr.No.	**References**
1.	Ulrich, K. T., & Eppinger, S. D. (2016). *Product design and development* (6th ed.). McGraw-Hill Education.

2.	Otto, K., & Wood, K. (2001). *Product design: Techniques in reverse engineering and new product development*. Prentice Hall.
3.	Pugh, S. (1991). *Total design: Integrated methods for successful product engineering*. Addison-Wesley

On-line resources to be used if available as reference material

On-line Resources
• Automotive Skills Development Council (ASDC) – Qualification Packs & NOS https://asdc.org.in • Society of Automotive Engineers (SAE International) – Technical Papers & Standards https://www.sae.org • Ministry of Heavy Industries, Government of India – Automotive Policies & Regulations https://heavyindustries.gov.in

Course Code	**BV05AEMAC02**	Title of the Course	**Tractors farm equipment and Off road vehicles**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Analyze power transmission systems, hydraulics, and traction mechanisms in tractors. 2. Study different types of farm equipment used for tillage, sowing, planting, harvesting, and crop processing.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Tractors** – Development of tractor- prominent makes in India, – Types of engines used, fuels used, – Horse power requirement, – Human factor in tractor design, traction theory, – Salient features of: Tractor chassis, clutch, power transmission and final drive, steering, – Brakes and wheels, power take off-draw bar working, – Working of hydraulic lift system, – Working principle of automatic draft sensing and control system.	50%
2.	**Farm Equipment:** – Working attachment of tractors-farm equipment – Classification – auxiliary equipment – Trailers and body tipping mechanism. **Introduction of off Road Vehicles**: – Classification - their application, – Excavator: different types of shovel and dragline, their construction, operating principles. – Production capacity and cost of production, transport equipment: various types of dumpers, main system, – Components and carrying capacity of dumper.	50%

Teaching-Learning Methodology	ICT through(e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to

1.	Select suitable farm equipment based on soil, crop, and operational requirements.
2.	Identify and troubleshoot common mechanical problems in tractors and farm machinery.
3.	Select suitable farm equipment based on soil, crop, and operational requirements.

Suggested References:

Sr.No.	References
1.	Road Making Machinery Abrosimov,K.BranBerg,AandKatayer,K.,MIR.PublishersMoscow 1971.
2.	Moving the Earth- Nichols, Herber L (Jr.), Galgotia Publishing House, New Delhi,1962.
3.	Design of Automotive Engines for Tractor- Kolchin. A., and V.Demidov, Mir Publishers,1972

On-line resources to be used if available as reference material

On-line Resources

- http://www.deere.com
- http://www.ciae.nic.in
- http://www.fao.org/home/en

Course Code	**BV05AEMAC03**	Title of the Course	**Vehicle Body Engineering**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Analyze loads, stresses, and safety aspects of vehicle bodies. 2. Identify different types of automobile body structures and layouts. 3. Understand the fundamentals of vehicle body design and construction.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Auto Body** – Introduction, – Main features and functions of body, body requirements, – Types: saloon, convertibles, limousine, estate car, racing and sports car. – Visibility: regulations, driver's visibility, tests for visibility, – Frame construction- tubular, interlaced, channel section, – Ladder type, car frame, truck frame.	50%
2.	**Body Structures-** – Frameless construction, – Integral construction, semi- unitary or endo- skeleton, – Unitary with sub frame, – Car body paneling, special purpose bodies, – Passenger and luggage requirements, all metal bodies, – Coach built bodies, auto floors, – Cowl assembly, front end assembly, – Roof assembly doors and doorfittings.	50%

Teaching-Learning Methodology	ICT through(e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Select appropriate materials for body construction.
2.	Differentiate between various body construction methods (body-on-frame, monocoque, space frame).
3.	Explain the components and structural members of vehicle bodies.

Suggested References:	
Sr.No.	**References**
1.	John Fenton, “Vehicle Body Layout & Analysis”, Hutchinson, London
2.	J Powloski, “Vehicle Body Engineering”, Business Books Ltd.,London.
3.	Crouse W. H. & Anglin D. L., “Automotive Chassis”, McGraw-Hill Int. BookCo.

On-line resources to be used if available as reference material

On-line Resources

- http://www.aplustopper.com/au3403-vehicle-body-engineering-syllabus/
- http://wjarr.com/content/vehicle-body-engineering-design-materials-and-structural-analysis
- http://www.amrita.edu/course/m-tech-in-automotive-engineering-vehicle-body-engineering/vehicle-body-engineering-syllabus-objectives-and-outcomes.html

Course Code	**BV05AEMIC04**	Title of the Course	**Element of noise, vibration and Harmless Control**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Identify and analyze common sources of NVH in engines, structures, and vehicles. 2. Study the effects of NVH on human comfort and fatigue. 3. Learn techniques for measurement and analysis of noise and vibration signals.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	– Introduce the concepts relating to Noise, – Vibration and Harshness (NVH): Define NVH terminology, necessity for NVH diagnosis, – Concepts of the transmission of vibration and sound, – Concepts of preventing excessive vibration and noise. – Develop skills in associating NVH symptoms to the: Sensation, Frequency range, Operating conditions, – Causes, Vibrating system.	50%
2.	– Vibration- Characteristics of vibration, – Oscillation, Cycle, – Dissipation of Energy from a Single Impact, – Sensors Signal, Calculating Component Frequency, – Amplitude, vibration measurement, – Natural frequency, – Resonance- resonance point, resonance graph (frequency – vehicle speed), Dampers. – Vibrations due to road roughness, vehicle ride model, – Human response to vibrations, sprung &unsprung mass, – Pitch & bounce, roll centre & roll axis. – Introduction to random vibrations, – Evaluation of vehicle, vibration in relation to ride comfort criterion. – Beating/ Phasing/ Growl, vibration order- tire frequencies, engine vibrations.	50%

Teaching-Learning Methodology	ICT through(e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to

1.	Propose design modifications or control strategies to reduce NVH.
2.	Analyze vibration data using time- and frequency-domain techniques.
3.	Identify major NVH sources in automotive and industrial systems.

Suggested References:

Sr.No.	References
1.	J.P. Den Hartog, “Mechanical Vibration”, 4th Edition, Mc Graw Hill, New York 1985.
2.	Daniel J. Inman, “Engineering Vibration”, Prentice Hall,NJ
3.	Julian Happian Smith, “An Introduction to Modern Vehicle Design”, Butterworth-Heinemann,Oxf

On-line resources to be used if available as reference material

On-line Resources

- http://www.slideshare.net/engg4u/nvh-in-automobiles-lecture-pdf
- http://www.engineeringsource.com/nvh-notes-ebook.pdf
- http://ocw.mit.edu/courses/mechanical-engineering/2-25j-fundamentals-of-noise-and-vibration-fall-2005/lecture-notes/

Course Code	**BV05AEMIC05**	Title of the Course	**Corrosion prevention and Vehicle body paint technology**
Total Credits of the Course	02	Hours per Week	02

Course Objective:	1. Understand corrosion mechanisms and environmental effects on materials. 2. Study the properties of paint systems and coatings used in vehicle bodies.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	– Corrosion, consequences of corrosion, – Chemistry of corrosion, – Factors that control the corrosion rate, – Corrosion prevention-conditioning the metal, – Conditioning the corrosive environment, – Electrochemical control.	50%
2.	– Different methods to remove paints, – Removing paint with disk grinder, paint removal, – Masking- precautions while masking, – Masking- trims and hardwares, – Molding and beading, windshield, panel, – Windows, upholstery, head lights, wheels, front end etc. – Painting Materials- acrylic lacquer, – Acrylic enamel, urethane enamel, – Synthetic enamel, comparison of cost, – Primer surfaces, primers, sealer, metallic, – Thinners and reducers, putty, – Wax polish and grease remover scrubbing compound, determining type of old finish. – Prepare surface for paint.	50%

Teaching-Learning Methodology	ICT through(e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Apply proper surface preparation and paint application methods.
2.	Describe the structure, chemistry, and functions of automotive paint layers.
3.	Evaluate corrosion prevention techniques and select appropriate methods.

Suggested References:

Sr.No.	References
1.	Baldev Raj, UkamachiMudali, S. Rangarajan, “Corrosion Prevention and Control”, Narosa Publication,2009
2.	R. Talbert, “Paint Technology Handbook”, Taylor & FrancesPublications.

On-line resources to be used if available as reference material

On-line Resources

- http://www.paint.org/education/courses/PDFs/surface_prep_coatings.pdf
- http://www.tcd.ie/Physics/undergraduate/assets/pdf/Corrosion.pdf
- http://www.engineersgarage.com/contribution/automobile-corrosion-andprotection

Course Code	**BV05AESEC06**	Title of the Course	**Industrial Training – V**
Total Credits of the Course	16	Hours per Week	36

Course Objective:	1. The Purpose of this Course is to Enable the Students for In-Depth analysis of at topic relating to his/ her area of Specialization 2. Develop and develop a comprehensive understanding on the same. For This the Students will Choose his/her faculty guide in his/her area of specialization and work on the topic jointly with the faculty. 3. The Students will Work on their projects individually and not in pairs or teams. 4. 4. The Institute may help the student in selecting a faculty guide in case a student is not able to do so, or if a faculty member is chosen by too many students.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	– The students have to undergone for internship/on the job training under any Concerned Organization in the areas of QP/NOS. – A presentation as well as report has to prepared and presented for the viva-voce and submit it to the concerned faculty.	100%

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr.No.	**Details of the Evaluation**	**Weightage**
1.	External Examination in the form of Practical ,Viva-voce and Reports	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Create project Report
2.	Enhance the confidence for future aspects

Suggested References:	
Sr.No.	**References**
1.	"Designing Effective Instruction" by Gary R. Morrison, Steven M. Ross, Jerrold E. Kemp, Howard K. Kalman
2.	"Training and Development for Dummies" by Elaine Biech
3.	"Effective On-the-job Training: Developing an OJT Program" by Joseph A. Benkowski

On-line resources to be used if available as reference material

On-line Resources
1. https://www.simplilearn.com/how-to-create-a-project-report-article

SABARMATIUNIVERSITY
BACHELOR OF VOCATIONAL STUDIES
SEMESTER VI
Automobile Engineering
(B.VOC-AE)

Subject		Course No.	Subject Title	T/P	Credit			Exam Duration	Marking Scheme		
					T	P	T		Internal	External	Total
Discipline Specific Course Core (Major)	Core Course-1	BV06AEMAC01	Research Methodology	T	1	-	1	2	25/09	25/09	50/18
	Core Course-2	BV06AEMAC02	Automobile refrigeration and Air conditioning	T	1	-	1	2	25/09	25/09	50/18
	Core Course-3	BV06AEMAC03	Vehicle safety engineering	T	1	-	1	2	25/09	25/09	50/18
Minor	Core Course-1	BV06AEMIC04	Electrical and Hybrid vehicle	T	1	-	1	2	25/09	25/09	50/18
Ability Enhancement Course		BV06AEAEC05	Automobile stimulation lab	T	2	-	2	2	25/09	25/09	50/18
Internship		BV06AEINT06	Internship	P	-	16	16	4	-	650/234	650/234
Minimum Quantifying Credits					**6**	**16**	**22**		**125/45**	**775/279**	**900/324**

Course Code	**BV06AEMAC01**	Title of the Course	**Research Methodology**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Build on fundamentals learned in Research Methodology I and advance skills in research design, data analysis, and report writing. 2. Strengthen the ability to write structured research reports and academic documents. 3. Develop competence in analyzing data, interpreting results, and presenting findings.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Sample Design** – Types of Sample Design – Probability/Non-Probability sample design – How to select a random sample – Complex Random Sampling Designs	50%
2.	**Measuring And Scaling Techniques** – Measurement in Research, Measurement Scales – Sources of Error in Measurement, Tests of sound measurement, Techniques for – Developing measurement tools – Scaling - meaning, classification, important scaling techniques – Scale construction: - Liker, Thurston. – Methods of Data Collection – Different methods of Primary data collection: Observation, Interview, Questionnaire, Schedules – Different Methods of Secondary Data Collection : Processing and Analysis of Data	50%

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Apply criteria to select proper statistical tests for given research questions.
2.	Conduct statistical hypothesis tests and choose appropriate statistical methods.
3.	Differentiate between population and sample and understand sampling techniques.

Suggested References:	
Sr.No.	**References**
1.	Research methodology by P. K. Manoharam
2.	Research methodology by Dr. C. Rajindra Kumar
3.	Research methodology methods and techniques by C. R. Kothari

On-line resources to be used if available as reference material

On-line Resources

- https://repository.dinus.ac.id/docs/ajar/Kothari__Research_Methodology_Methods_and_Techniques_-_2004.pdf
- https://www.researchreinforcement.com/
- http://business.iisuniv.ac.in/courses/subjects/research-methodology-ii-13

Course Code	**BV06AEMAC02**	Title of the Course	**Automobile refrigeration and Air conditioning**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Identify and describe main components of automobile AC and refrigeration units, their functions, and operation. 2. Understand the fundamental principles of refrigeration and air conditioning as applied in automotive systems.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	– Refrigeration Principles of refrigeration, – Performance parameters, Types of refrigeration systems, – Study of simple Vapor compression refrigeration system, and System components, – Applications of refrigeration- Need of transport refrigeration, introduction to food preservation, – Types of transport refrigeration systems.	50%
2.	– Refrigerants Definition, desired properties like thermodynamic, chemical & physical and classification. – Selection of refrigerants, Effect on ozone depletion and global warming, introduction to alternative refrigerants.	50%

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	erform basic maintenance, fault diagnosis, and servicing procedures on automotive HVAC units.
2.	Describe the function of automotive heating and ventilation subsystems along with air distribution.
3.	Differentiate between various types of refrigerants, compressors, and control mechanisms used in automotive HVAC.
4	Explain the working principle of automobile refrigeration and air conditioning systems and identify functional components.

Suggested References:	
Sr.No.	**References**
1.	McQuiston, Parker and Spitler, Heating, "Automotive Air Conditioning, Analysis and Design", Wiley 6thEdition Wiley StudentEdition.
2.	Stoecker, W.F., "Refrigeration & Air Conditioning", 2nd Edition, Tata McGraw Hill, New York, 2009 Tom, Birch, "Automotive Heating and Air Conditioning", Prentice Hall,2010
3.	Mitchel Information Services, Inc., Mitchell, "Automatic Heating and Air Conditioning Systems", Prentice Hall, Inc.,2010

On-line resources to be used if available as reference material

On-line Resources

- https://www.aicte.gov.in/sites/default/files/Refrigeration%20and%20Air%20Conditioning.pdf
- https://www.scribd.com/document/779333893/b-voc-Automobile-Auto-Electrical-Electronics-for-2021-1
- http://gturanker.org/syllabus/BV/04/5/

Course Code	**BV06AEMAC03**	Title of the Course	**Vehicle Safety Engineering**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Familiarize learners with vehicle body design and crashworthiness principles, emphasizing safety in vehicle structure and occupant protection. 2. Introduce students to fundamental concepts of vehicle safety, including both active and passive safety systems used in automobiles.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	**Automotive vehicle testing for Safety:** – Introduction to active & passive vehicle safety systems, – Occupant safety system- seat belts and belt tighteners, – Front air bag, side air bag, rollover protection system	50%
2.	– Braking test (asperIS11852-2001), – ABS performance & Traction control test Seatbelt anchorage testing, – Horn, lighting installation and mirror, test.	50%

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Analyze how crashworthiness features and safety systems influence vehicle performance during accidents.
2.	Understand and explain key concepts of vehicle safety and safety-centric vehicle design.

Suggested References:	
Sr.No.	**References**
1.	U. W. Seiffert M. Gonter, “Integrated Automotive Safety Handbook”, Published bySAE-International ISBN (978-07680-6437-7)
2.	Robert Bosch, “Bosch Automotive Handbook”, 7th Edition, John Wiley &Sons

On-line resources to be used if available as reference material

On-line Resources

- https://brpaper.com/ptu/b-tech/ae/6/vse
- https://vit.ac.in/wp-content/uploads/2026/01/AY_2025_26_M.Tech_MEA.pdf
- http://www.pce.ac.in/wp-content/uploads/2022/10/Syllabus-B.-Tech-in-Electronics-and-Telecommunication-Engg.pdf

Course Code	**BV06AEMIC04**	Title of the Course	**Electrical and Hybrid vehicle**
Total Credits of the Course	01	Hours per Week	01

Course Objective:	1. Develop skills to analyze power flow and functional performance of both electric and hybrid powertrain systems. 2. Familiarize learners with electric drive systems, energy storage technologies, and hybrid drivetrain control.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Introduction:** – Define fuel economy, carbon foot print, – Factors affecting fuel economy, – Possible actions, alternative energy sources- hybrid in history, hybrid cars. – Basic concept of electric traction, introduction to various electric drive train topologies.	50%
2.	**Drivetrain structure:** – Conventional drive train, – Parallel drive train, series hybrid Drivetrain, combined (split) hybrid, all wheel drive hybrid, – Merits and demerits of different drive trains.	50%

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern		
Sr. No.	**Details of the Evaluation**	**Weightage *(%)**
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Evaluate the requirements and characteristics of electric drive system components.
2.	Analyze the power flow and function of electric and hybrid drive trains.
3.	Understand the importance and impact of electric and hybrid vehicles on society and the environment.

Suggested References:

Sr.No.	**References**
1.	Emadi Ali, “Vehicular Electric Power System”, Marcel Dekker, Inc.2004
2.	Robert Bosch, “Bosch Automotive Handbook”, 7th Edition, John Wiley &Sons.
3.	Alternative Fuels: “Fuel Cells and Natural Gas-Society of Automotive Engineers”, Incorporated, 600.

On-line resources to be used if available as reference material

On-line Resources

- https://www.inspirenignite.com/anna-university/au3791-electrical-and-hybrid-vehicles-syllabus-for-auto-2021-regulation
- http://jcboseust.ac.in/assets/files/B.Voc_Automobile_Syllabus_2024-25.pdf

Course Code	**BV06AEAEC05**	Title of the Course	**Automobile stimulation lab**
Total Credits of the Course	02	Hours per Week	02

Course Objective:	1. Introduce students to modelling and simulation workflows for vehicle systems using MATLAB/Simulink and industry simulators. 2. Give practical experience in building, validating and interpreting models for vehicle dynamics, powertrain and braking systems. 3. Develop ability to run virtual experiments (what-if studies) and evaluate control strategies (ABS, cruise control, simple ADAS features) in simulation.

Course Content		
Unit	**Description**	**Weightage *(%)**
1.	**Modelling fundamentals & core experiments (6–8 lab sessions)** – Intro to simulation toolchain: MATLAB/Simulink basics for automotive modelling. – Longitudinal dynamics: simple vehicle model, drive cycles, acceleration/braking simulations, fuel/energy consumption estimation. – Lateral dynamics & handling basics: single-track (bicycle) model, steady-state cornering, understeer/oversteer studies. – Tire modelling & contact: simple tyre force models and parameter sensitivity. – Powertrain basics: engine map lookup, simple EV motor/inverter model, driveline simulation	50%
2.	**Advanced co-simulation, control, and applications (6–8 lab sessions)** – Suspension and ride: quarter/half-car models, active/semi-active control demonstration. – Braking & ABS demonstration: ABS logic, stop-distance tradeoffs, co-simulation with tyre model. – ADAS / control experiments: adaptive cruise control (simple	50%

	PI/PID), basic lane-keeping simulation (model in Simulink). – Co-simulation with industry tools (CarSim / AVL / Cruise M) — importing/exporting models, joint validation examples. – Mini project: each student/team runs a simulation study (e.g., compare ICE vs. EV drive cycles, tune suspension for improved handling, evaluate ABS strategy) and submits final report + demo	

Teaching-Learning Methodology	This laboratory course gives hands-on experience in modelling, simulation and virtual testing of automobile systems using mainstream tools (MATLAB/Simulink, CarSim/TruckSim, AVL/CRUISE) and applies those models to vehicle dynamics, powertrain and control/ADAS experiments.

Evaluation Pattern

Sr. No.	Details of the Evaluation	Weightage *(%)
1.	Internal Written / MCQ	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Outcomes: Having completed this course, the learner will be able to

1.	Create and run vehicle subsystem models (longitudinal, lateral, suspension, powertrain) in MATLAB/Simulink and interpret the results.
2.	Perform comparative simulation studies (e.g., effect of tyre parameters, suspension tuning, EV energy flow) and prepare lab reports with quantitative analysis.
3.	Implement and test basic control algorithms (ABS logic, cruise control, simple lane-keeping) in a simulated environment and evaluate performance metrics

Suggested References:

Sr. No.	References
1.	Rajamani, R. (2012). *Vehicle Dynamics and Control* (2nd ed.). Springer. (APA) Rajamani, R. (2012). *Vehicle Dynamics and Control* (2nd ed.). Springer.

2.	Rill, G., & Arrieta Castro, A. (2020). *Road Vehicle Dynamics: Fundamentals and Modeling with MATLAB®* (2nd ed.). CRC Press / Routledge. (APA) Rill, G., & Arrieta Castro, A. (2020). *Road Vehicle Dynamics: Fundamentals and Modeling with MATLAB®* (2nd ed.). CRC Press.
3.	Gillespie, T. D. (1992; revised ed. 2021). *Fundamentals of Vehicle Dynamics* (Revised ed.). SAE International. (APA) Gillespie, T. D. (1992; revised ed. 2021). *Fundamentals of Vehicle Dynamics* (Revised ed.). SAE International

On-line resources to be used if available as reference material

On-line Resources
• MATLAB& Simulink — Automotive applications and examples (MathWorks). • https://www.mathworks.com/help/simulink/automotive-applications.html • AVL — Vehicle simulation solutions and co-simulation (AVL CRUISE / systems). • https://www.avl.com/en-in/simulation-solutions/vehicle-simulation • CarSim / TruckSim / BikeSim — vehicle dynamics simulation tools (Mechanical Simulation / CarSim)

Course Code	**BV06AEINT06**	Title of the Course	**Internship**
Total Credits of the Course	16	Hours per Week	36

Course Objective:	1. The Purpose of this Course is to Enable the Students for In-Depth analysis of at topic relating to his/ her area of Specialization 2. Develop and develop a comprehensive understanding on the same. For This the Students will Choose his/her faculty guide in his/her area of specialization and work on the topic jointly with the faculty. 3. The Students will Work on their projects individually and not in pairs or teams. 4. The Institute may help the student in selecting a faculty guide in case a student is not able to do so, or if a faculty member is chosen by too many students.

Course Content

Unit	**Description**	**Weightage *(%)**
1.	– The students have to undergone for internship/on the job training under any Concerned Organization in the areas of QP/NOS. – A presentation as well as report has to prepared and presented for the viva-voce and submit it to the concerned faculty.	100%

Teaching-Learning Methodology	ICT through (e.g. Power Point presentation, Audio-Visual Presentation) Group Discussion, Role Playing, Case Study

Evaluation Pattern

Sr. No.	**Details of the Evaluation**	**Weightage**
1.	External Examination in the form of Practical ,Viva-voce and Reports	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Create project Report
2.	Enhance the confidence for future aspects

Suggested References:	
Sr. No.	**References**
1.	"Designing Effective Instruction" by Gary R. Morrison, Steven M. Ross, Jerrold E. Kemp, Howard K. Kalman
2.	"Training and Development for Dummies" by Elaine Biech
3.	"Effective On-the-job Training: Developing an OJT Program" by Joseph A. Benkowski

On-line resources to be used if available as reference material

On-line Resources
1. https://www.simplilearn.com/how-to-create-a-project-report-article