DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.



CIRCULAR NO.SU/SYLLABUS/B.VOC./ 20/2020.

It is hereby inform to all concerned that, on recommendation of Ad-hoc Board in Vocational Studies [B.Voc.], the Hon'ble Vice-Chancellor has accepted the revised curriculum of B. Voc. [Ist Semester] in 1] Industrial Automation and 2] Automobile under the Choice Based Credit and Grading System in his emergency powers under Section-12[7] of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

This is effective from the Academic Year 2020-21 and Onwards under the Faculty of Science & Technology.

This curriculum is also available on the University website www.bamu.ac.in.

All concerned are requested to note the contents of the circular and bring notice to the students, teachers and staff for their information and necessary action.

University campus, }{
Aurangabad-431 004. }{
Ref. No.SU/B.voc./syllabus./2020-21/ }{
Date: 25.01.2021 27024 - 34 }{

Deputy Registrar, Academic Section.

Copy forwarded with compliments to :-

 The Head/Principals, Concerned Department / Colleges, Dr. Babasaheb Ambedkar Marathwada University.

The Director, University Network & Information Centre, UNIC, with a request to upload the curriculum along with this Circular on University Website.

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr.BAMU, A'bad
- 2] The Concerned Section Officer, Examination Branch,

3] The Section Officer, [Eligibility Unit],

- 4] The Programmer [Computer Unit-1] Examinations,
- 5] The Programmer [Computer Unit-2] Examinations,
- 6] The In-charge, [E-Suvidha Kendra],
- 7] The Public Relation Officer,
- 8] The B.Voc Section, Dr. BAMU, A'bad
- 9] The Record Keeper,

301-0212 30/

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY AURANGABAD



COURSE STRUCTURE & CURRICULUM
BACHELOR OF VOCATIONAL

IN

Automobile First Year

Choice Based Credit System

Effective form the Academic Year 2020-2021 & Onwards

Approved 2

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1/12/2020

B.Voc Automobile First Year

Pattern 2020

1/12/2020

B.Voc Automobile First Year

Pattern 2020

Curriculum for Bachelor in Vocation (B.Voc.)

(Choice Based Credit System)

This Bachelor in Vocation programme is divided into six semester shaving 180 credits. Each semester will have courses based on General Education Components and Skill Development Components. In each Semester, there will be four theory components of skill development with their corresponding laboratory coursework, apart from general education components. Moreover, each semester will contain dedicated Project and/or Industrial Training/Internship. The program offers following General Education Componentsviz. Linguistic Proficiency, Computer Science, Environment Management, Business & Accounting, Industrial Ethics and Safety Management, Statistical Tools, Commerce & Management Fundamentals and Skill DevelopmentComponents in the sectors of Automobile, Automobile, Travel and Tourism,

Preamble:

Dr. Babasaheb Ambedkar Marathwada University (BAMU) proposes to offer at three year Bachelor programme invocation (B. Voc.). The curriculum design of this program is undertaken in the following framework (assumptions).

a) Although there has been remarkable progress in all sectors of education in last couple of decades, the less regulated area of the education sector-vocational training—seems to have lost its significance/importance. This has led to the widening gap between the supply and demand for skilled manpower across various industries and R&D organizations. This shortage of skills has translated directly into unemployment among an increasing number of graduates who pass-out every year and are forced to bare-trained in order to become market table.

This programme is designed to produce skilled manpower so that wide variety of options in automobiles, industrial automation and travel &tourism would be available and it will improve the opportunities for the unemployed youths in the country in both the private and public sectors.

b) According to a study conducted by the Associated Chambers of C ommerce and Industry of India (ASSOCHAM), there will be a deficit of 40 million working professionals by the year 2020 and the employers would face the difficulty of filling positions because of the dearth of suitable talent and skilled person all in their industry.

This programme aims to provide some solution for this problem and this would facilitate to improve:

- (i) Quality of training
- (ii) High drop-out rates
- (iii) Linkages with Universities and industry
- (iv) Inadequacy of resources.
- c) This programme is intended to offer practical training and skills needed to pursue an occupation straight away. It will provide options to the students to select the courses of their choice which are directly aligned to land a job in a chosen profession or a skilled trade. The end result of this programme is to enable an individual to at train self-employment.

Program Educational Outcomes (PEO):

The Objective of the B.VOC Automobile program are to produce graduates who:

- Have a strong foundation in Automobile systems and Automobile Troubleshooting and Diagnostics with an ability to solve important problems in modern technological society as valuable, productive technicians and supervisors.
- Have a broad based background to practice B.VOC Automobile in the areas of Automobile Manufacturers, Service Industry, Autotronics, Auto Ancillary industry and Government sectors meeting the growth expectations of stakeholders.
- 3. Have an ability to pursue higher studies and succeed in academic and professional
- Have the ability to address professional demands individually and as a team member communicating effectively in technical environment using modern tools.
- 5. Recognize the need for and possess the ability to engage in lifelong learning.
- Will be sensitive to consequences of their work both ethically and professionally for productive professional career.

Program Outcomes (PO):

Vocational Education is education that prepares the students for specific trades, crafts and career sat various levels and scopes. It trains the students from a trade/ craft, technician or professional position in R & D organizations.

The Program Outcomes are the skills and knowledge which the students have at each exit level/at the time of graduation. These Outcomes are generic and are common to all exit levels mentioned in the programme structure.

- PO 1. Basic knowledge: Apply knowledge of basic sciences, basic statistical, and fundamental engineering/ technology to solve the broad spectrum Automobile related problems.
- PO 2. Discipline knowledge & Problem Analysis: Apply transboundary knowledge of a broad spectrum of technology that encompanses(but not limited to) electronics, mechtronics, electrical, robotics and control system to identify Automobile related problems.

- PO 3. **Design Development of solutions:** Design / develop solutions for complex engineering or technological problems or challenges for Automobile related problems
- PO 4. Conduct Investigation of complex problems: Use research based knowledge and research method including design of experiments/systems, analysis and interpretation of data and synthesis of information to provide valid conclusion
- PO 5. Modern tools: Apply relevant and recent Automobile technologies and tools with an understanding of the limitations,
- PO 6. The engineer and society: Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to practice in field of Automobile.
- PO 7. Environment and sustainability: Apply Automobile solutions for sustainable development practices in societal and environmental contexts.
- PO 8. Ethics: Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Automobile.
- PO 9. Individual and team work: Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- PO 10. Communication: Communicate effectively in oral and written form.
- PO 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member and leader in a team, to complete project in any environment.
- PO12. Life-long learning: Engage in independent and life-long learning activities in the context of technological changes also in the Automobile based industry.

Program Specific Objectives (PSO):

After 3-4 years of completion of the program, students will be able to -

- Apply knowledge of motor vehicles, their manufacturing and servicing & repair technology in solving complex problems in automotive field.
- 2. Design systems for motor vehicles, their manufacturing & servicing & repair sectors.
- 3. Diagnose faults in motor vehicles and its systems.

Exit Options:

The course allows exit of a student from the course on successful employment. Scopes will be there for further continuation of study. The other wise exit options will be as follows-

Exit Point	Duration	Diploma / Degree to be Offered
First exit	After 6 months	Certificate in Vocation
Second exit	After 1 yr.	Diploma in Vocation(D. Voc.)
Third exit	After 2 yrs.	Advanced Diploma in Vocation(Adv. D. Voc.)
Fourth exit	After 3 yrs.	Bachelor in Vocation (B. Voc.)

Eligibility:

XII Science or equivalent/ MCVC/ ITI (two years) with relevant/equivalent trade from any recognized Board/Institution are eligible for registration/ admission to first year (Semester I) of B.Voc Automobile Degree program.

Admission / Promotion Process:

Admission process will be as per University rules.

A candidate who has sought admission to Semester – I shall be admitted to Semester – II automatically. A candidate who has passed 75% of the papers at First Year (First and Second Semesters together) examinations shall be allowed to take admissions in third semester. Similarly, a candidate who has passed 75% of the papers at the Second Year (Third and Fourth Semesters together) examinations shall be allowed to take admission to the Fifth semester.

However, if a candidate has not passed the First and Second Semester examinations, he shall not be allowed to take admission to the Fifth Semester. Appearance in the First, Third and Fifth semester is compulsory to get promoted to next semester

Choice Based Credit System (CBCS):

The choice-based credit system is going to be adopted. This provides flexibility to make the system more responsive to the changing needs of our students, the professionals and society. It gives greater freedom to students to determine their own pace of study. The credit-based system also facilitates the transfer of credits.

- · Students will have to earn 30 credits for the award of Six Month Certificate in Vocation
- Students will have to earn 60 credits for the award of one year Diploma in Vocation (D. Voc.)
- Students will have to earn 120 credits for the award of two year Advance Diploma in Vocation (Adv. D. Voc.)

 Students will have to earn 180 credits for the award of three year Bachelor Degree in Vocation (B. Voc.)

Credit-to-contact hour Mapping:

- (a) One Credit would mean equivalent of 15 contact hours for theory lecture.
- (b) For lab course/ workshops/internship/field work/project, the credit weightage for equivalent hours shall be 50% that for lectures /workshop.
- (c) For self- learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures/workshops.

Attendance:

Students must have 75 % of attendance in each course for appearing examination otherwise he / she will not be strictly allowed for appearing the examination of each course.

Departmental Committee:

The Departmental Committee (DC) of the Centre will monitor smooth functioning of the program.

Results Grievances / Redressal Committee

Grievances / redressal committee should be constituted in the department to resolve all grievances relating to the evaluation. The committee shall consist of Head of the department, the concerned teacher of a particular course and senior faculty member of Department of Committee. The decision of Grievances / redressal committee will have to be approved by Department committee.

Evaluation Methods:

The assessment will be based on 20: 80 ratio of continuous internal assessment (CIA) and semester end examination (SEE). Performance will be decided after combining performance in CIA and SEE. In case of failure in SEE in particular course(s), exam will be conducted in immediate subsequent semester.

Continuous Internal Assessment (CIA):

For 4 credit courses-

There will be 20 marks for Continuous Internal Assessment. Two internal tests (of 20 marks each) will be conducted, after completion of 40% and 80% of the curriculum respectively.

Average performance of the two tests will be considered for final marks-memo preparation. The setting of question papers and the assessment will be done by concerned teacher.

Semester End Examination (SEE):

The semester end theory examination for each theory course of 4 credits will be of 80 marks. Therefore, the total marks shall be 100 for 4 credit theory course (80 marks semester end exam ± 20 marks CIA).

Pattern of semester end question paper will be as below:

For 4 credit courses-

- The semester end examination of theory course will have two parts (20+60 = 80 Marks)
- Part A will be consisting of 10 questions having 2 marks each (multiple choice questions / fill in the blanks/ answer in one sentence) as compulsory questions and it should cover entire course syllabus (20 Marks)
- Part B will contain 05 questions of 12 marks each with equal weightage on every module. Each of these questions will have two options, from which students will have to attempt any one.
- 20 to 30% weightage can be given to problems/ numerical (wherever applicable) wherein use of non-programmable scientific calculator may be allowed.
- Number of sub questions (with allotment of marks) in a question may be decided by the examiner.

Regarding practical examinations

During each semester, student must perform at least fifteen experiments from laboratory course. Semester end practical examination will be conducted at the end of each semester.

Earning Credits:

At the end of every semester, a letter grade will be awarded in each course for which a student had registered. A student's performance will be measured by the number of credits that he/she earned by the weighted Grade Point Average (GPA). The SGPA (Semester Grade Point Average) will be awarded after completion of respective semester and the CGPA (Cumulative Grade Point Average) will be awarded at the respective exit point.

Grading System:

The grading reflects a student-own proficiency in the course. A ten-point rating scale shall be used for the evaluation of the performance of the students to provide letter grade for each course and overall grade for the Bachelor Programme. Grade points are based on the total number of marks obtained by him / her in all heads of the examination of the course. The grade points and their equivalent range of marks are shown in Table-I

Table - I: Ten point grade and grade description

Marks Obtained (%)	Grade Point	Letter Grade	Description
90-100	9.00- 10	0	Outstanding
80-89	8.00-8.99	A++	Exceptional
70-79	7.00-7.99	A	Excellent
60-69	6.00-6.99	A	Very Good
55-59	5.50-5.99	В	Good
50-54	5.00-5.49	В	Fair
45-49	4.50-4.99	C++	Average (Above)
41-44	4.1-4.49	С	Average
40	4.0	P	Pass
< 40	0.0	F	Fail (Unsatisfactory)
	0.0	AB	Absent

- Non-appearance in any examination / assessment shall be treated as the students have secured zero marks in that subject examination / assessment.
- Minimum P grade (4.00 grade points) shall be the limit to clear / pass the course / subject. A student with F grade will be considered as —failed in the concerned course and he / she has to clear the course by appearing in the next successive semester examinations. There will be no revaluation or recounting under this system.
- Every student shall be awarded grade points out of maximum 10 points in each subject (based on 10 point scale). Based on the grade points obtained in each subject, Semester
- Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and CGPA will be given at respective exit point.

Computation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average)

Grade in each subject / course will be calculated based on the summation of marks obtained in all five modules.

The computation of SGPA and CGPA will be as below

Semester Grade Point Average (SGPA) is the weighted average points obtained by the students in a semester and will be computed as follows:

- The SGPA will be mentioned on the grade card at the end of every semester.
- The Cumulative Grade Point Average (CGPA) will be used to describe the overall performance of a student in all semester of the course and will be computed as under.

Sum (All six Semester SGPA)

CGPA = ----
Total Number of Semester

· The SGPA and CGPA shall be rounded off to the second place of decimal.

Grade Card

Results will be declared by the Centre and the grade card (containing the grades obtained by the student along with SGPA) will be issued by the university after completion of every semester. The grade card will be consisting of following details.

- Title of the courses along with code opted by the student. Credits associated with the
 course.
- · Grades and grade points secured by the student.

- Total credits earned by the student in a particular semester. Total credits earned by the students till that semester.
- · SGPA of the student.
- · CGPA of the student (at respective exit point).

Cumulative Grade Card

The grade card showing details grades secured by the student in each subject in all semesters along with overall CGPA will be issued by the University at respective exit point.

	P	roposed Course Structure for Bachelo DeenDayal Upadhyay	KAU	SHAL K		oile Divi	sion of		
Sr. No.	N	from Academic ame of the Course	Cont	2020-21 act Hour eek	s Per	Evaluation Scheme		Total Marks	Credit
				T	P	CIA	SEE		
		SEMESTI	ER-I						
220	neral Academic Co	mponent							
1	AUVOC 101	Linguistic Proficiency (English)	3	1	0	20	80	100	4
2	AUVOC 102	Basic Automobile Systems	3	1	0	20	80	100	4
3	AUVOC 103	- Burney Company	3	1	0	20	80	100	4
	ill Development Cor			2					
4	AUVOC 104	Basic Auto Electrical system	3	1	0	20	80	100	4
5	AUVOC 105	Lab Course-I	*	-	8	-	100	100	4
6	AUVOC 106	Laboratory Project-I	-		*	-	200	200	10
		<u> </u>			-		TOTAL	700	30
		SEMES	TER -	П					
Con	neral Academic Co	POLYER NAME OF THE POLYER OF T							
1									
2	AUVOC201	Industrial Safety Practices	3	1	0	20	80	100	4
3	AUVOC202	Engine Electrical Systems	3	1	0	20	80	100	4
T	AUVOC203	Fuel Injection and Ignition System	3	1	0	20	80	100	4
4 4	ll Development Cor		-	1 2					
12.	AUVOC204	Engine Control Systems	3	1	0	20	80	100	4
5	AUVOC205	Lab Course-II	•	(8)	8	7	100	100	4
6	AUVOC206	Laboratory Project-II	-	-	-	-	200	200	10
		-					TOTAL	700	30
		SEMEST	ER-1	Ш					
Cor	neral Academic Con								
1				г.			0.0		
	AUVOC301	Energy and Environment	3	1	0	20	80	100	4
2	AUVOC302	Suspension and Steering System	3	1	0	20	80	100	4
3A	L LING COOR L	Elective -I (any one among Al	1	1		1	00	100	
3B	AUVOC303A	Tires and Braking system Automotive Fuel and Emission Control	3	1	0	20	80	100	4
457	AUVOC303B Il Development Con	System	3	1	0	20	80	100	4
OKI	ii bevelopinent Con	. A 27 A 29	11100	2011		20.422			
4A	AUVOC304A	Elective -II (any one among Al	3	304A and	0	20	80	100	4
4B	AUVOC304A	Automobile Transmission System	3	1	0	20	80	100	4
5	AUVOC304B	Automobile Body Repair Technology Lab Course-III	-	-	8	-	100		4
6	AUVOC305 AUVOC306	Laboratory Project-III	-	-	8	-	200	100 200	
*	AUVOC306	Canon and y 1 roject-111	9.83		0.91	*			10
							FOTAL	700	30

Sr. No.	Name of the Course		Contact Hours Per Week			Evaluation Scheme		Total Marks	Credi
			L	T	P	CIA	SEE		
		SEMEST	ER-IV						
Gene	eral Academic Com	ponent							
1	AUVOC401	Entrepreneurship Development	3	1	0	20	80	100	4
2	AUVOC 402	Autotronics	3	1	0	20	80	100	4
		Elective -I (any one among A	UVOC4	03A and	AUVOC	403B)			
3A	AUVOC 403A	Automotive Fault Diagnostics	3	1	0	20	80	100	4
3B	AUVOC 403B		3	1	0	20	80	100	4
Skill	Development Comp								
		Elective -II (any one among A	UVOC4	04A and	AUVOC	(404B)			
4A	AUVOC 404A	Hybrid Vehicles	3	1	0	20	80	100	4
4B	AUVOC 404B	Vehicle Testing	3	1	0	20	80	100	4
5	AUVOC 405	Lab Course-IV	. 4	-	8	-	100	100	4
6	AUVOC 406	Laboratory Project-IV		2	2	-	200	200	10
	*						TOTAL	700	30
	/m	SEME	STER - V	,		-77			
1	Industrial On-Jo	ob Training-I						700	30
							TOTAL	700	30
		SEMES	STER - V	1					
1	Industrial On-,	Job Training-II						700	30
						L	TOTAL	700	30

Total Credits (Three Years): 180 Credits Total Marks: 4200

Glossary and Notes:

CIA: Continuous Internal Assessment

SEE: Semester End Examination

L: Theory Lecture T: Tutorial

P: Practical/ Hands-on

AUVOC: Automobile Vocational

Semester-I

General Education Components

AUVOC-101: Linguistic Proficiency (English)

(4 Credits: 100 Marks)

Learning Objectives

To provide students with-

- 1. Fundamental grammatical tools for sentence formation
- 2. Basic Concepts of Tense
- 3. Basic tools for effective verbal and written communication in English language

Course Outcomes

On completion of the course, students should be able to -

- 1 Apply grammatical tools to formulate correct sentences in English.
- 2 Apply concept of tenses to formulate correct sentences in English.
- 3 Formulate different types of dialogues, expression of ideas/information in English
- 4 Compose applications, reports, requests, responses, summary and comprehensions in English

Course Contents

Unit 1: Functional Grammar Elements

(09 Hrs)

Recapitulation of Grammar – Noun, Verb (Classifications), Infinitive and Gerunds, Auxiliaries and Modals, Passivity, Conditionals, Concord, Articles, Conjunction, Prepositions, Pronouns, Adverbs; Active and Passive Voice; Question Tag

Unit 2: Tenses (09 Hrs)

Present Tense, Past Tense, Future Tense (all four types to be included in each)

Unit 3: Sentence Formation (09 Hrs)

Types of Sentences – Simple, Complex, Compound; Phrases; Clauses; Synthesis of Sentences; Transformation of Sentences; Direct and Indirect Speech

Unit 4: Basic Verbal Communications

(09 Hrs)

Introducing yourself (The communicator); Introducing people to others; Giving personal information; Getting people's attention and interrupting; Giving instructions and seeking clarifications; Making requests and responding to requests

Unit 5: Basic Writing Skill

(09 Hrs)

Writing Notices; Drafting Agendas; Writing minutes; Note taking; Writing applications for various jobs, referring to the ads.; Writing summary; Writing advertisements

Unit 6: Tutorial(15 Hrs)

References:

Text:

- High School Grammar and Composition; Wren and Martin; Fifteenth Edition; Blackie Elt Books; India; ISBN- 978-81-219-0009-6
- Synergy: Communication in English and Study Skills; Board of Ed.; 2008; Orient Blackswan; India; ISBN- 978-81-250-3577-0
- 3. Business Communicator V.K. Jain, O. P. Biyani, S. Chand, New Delhi.

Suggested Reading:

- 1. Macmillan Foundation English R. K. Dwivedi, A. Kumar: Macmillan India Ltd.2001
- 2. The Art of Powerful Communication Dinesh K. Vohra, Are Maria Publications, Pune

AUVOC 102 Basic Automobile Systems : [ASC/N 1402]

(4 Credits 100 Marks)

Learning Objective:

To introduce students with basic automobile concepts like

- 1. Four stroke engines,
- 2. Engine lubrication system,
- 3. Engine cooling system,
- 4. Fuel injection system and intake/exhaust systems.

Course Outcomes:

- Explain the auto component manufacturer specifications related to the various components/aggregates in the vehicle.
- Explain functioning of Basic Automobile systems components and aggregates of a vehicle.

Contents:

Unit I: The four stroke cycle and cylinder arrangement

(9Hours)

Introduction, Engine cycles, Intake, Compression, Power, Exhaust strokes, Petrol and Diesel engines, principles, cylinder arrangement, valve arrangement, vehicles with alternate power stations.

Unit II: Engine oil and lubrication systems (9 Hours)

Introduction, Engine Oil rating and classifications, Oil pumps, Oil filters, Lubrication system, purpose and operation.

Unit III: Engine coolant and Cooling system

(09 Hours)

Introduction, Engine coolant, Radiators and coolant, recovery systems, heater core, hoses, water pump, water pump drive belts, thermostat, cooling fans, cooling system operation, temperature indicators.

Unit IV: Fuel Injection and Ignition systems

(09 Hours)

Fuel Systems, Petrol fuel injection systems, Electronic control system, Air supply, Fuel supply, Gasoline direct injection, Diesel fuel injection systems, Common rail system, Alternative fuels

Ignition system overview, Electronic Ignition, Distributor less ignition system (DIS), Coil on plug (COP) direct ignition system, Spark plugs

Unit V: Intake and Exhaust systems

(09 Hours)

Introduction, The air induction system, Air Intake Ductwork, Air cleaner/filter, IntakeManifold, Vacuum Basics, Vacuum systems, Exhaust system components, Catalytic converters, Exhaust system purpose andoperations.

Unit VI: Tutorial(15 Hours)

References:

- 1) Automotive Mechanics: William H. Crouse, Donald L. Anglin: Tata McGraw Hill 10^{th} edition ISBN:9780070634350.
- 2) Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill ISBN10:0074602160.
- Basic Automobile Engineering: C P Nakara: Dhanpatrai publicationISBN-10:9352160983.
- 4) Automotive Mechanics: SShrinivasan: Tata McGraw Hill Second edition ISBN 108187433221.
- 5) Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributers ISBN-10: 8180141969.

AUVOC 103 Engineering Drawing

(4 Credits 100 Marks)

Learning Objective:

To introduce students with concepts of

- 1. Orthographic projections,
- 2. Isometric projections and
- 3. Job drawing in shop floor.

Course Outcomes:

- · Know the importance of drawing standards and drawing basics to prepare drawing.
- Visualize geometrical solids and draw orthographic projections for given solid.
- Demonstrate ability to prepare projections of points, lines, planes, solids.
- · Draw and interpret section of solids
- Draw isometric view and projections for given orthographic projections.

Contents:

Unit I :Introduction to Drawing and Orthographic projections

(9Hours)

Drawing standard, Types and convention of lines and their applications, Letters and numbers (single stroke vertical), Dimensioning technique as per SP-46 (Latest edition), Scale (reduced, enlarged & full size).

Introduction to Orthographic projections, Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only) – elevation, plan and end view Selection of section plains and drawing sectional view (simple object)

Unit II : Projections Lines and Planes

(9Hours)

Projection of lines parallel and perpendicular to one or both planes, projection of lines inclined to one or both planes.

Projection of planes parallel and perpendicular to one or both planes, projection of planes inclined to one or both planes.

Unit III : Projections of Solids

(9Hours)

Types of solids, projections of solids with axis perpendicular and parallel to HP and VP, solids with axis inclined to one or both the planes.

Unit IV: Section of Solids

(9Hours)

Section of solids: Section planes perpendicular to one plane and parallel or inclined to other plane.

Unit V: Isometric projections

(9Hours)

Isometric scale, comparison of true scale with isometric scale, Conversion of orthographic views into isometric View / projection

Unit VI: Tutorial(15 Hours)

References:

- 1. N. D. Bhatt, "Engineering Drawing", Charotar Publishing House, Anand, India. 2. K. V. Nataraajan, A text book of Engineering Graphic, Dhanalakshmi Publishers, Chennai,
- 3. K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International (P) Ltd,

Skill Education Component

AUVOC 104 Basic Auto Electrical Systems [ASC/N1402, ASC/N 1403, ASC/N 1418] (4 Credits 100 Marks)

Learning Objectives:

To introduce students with basic concepts of

- 1. Ohms law,
- 2. Automotive wiring,
- 3. Electrical testing equipments, and
- 4. Different types of electrical problems.

Course Outcomes

- 1. Describe the different possible types of electrical problems.
- Describe how each of the major types of electrical test equipment are connected and interpreted.
- 3. Explain how to use a DMM for diagnosing electrical and electronic systems.
- 4. Explain how to use an oscilloscope for diagnosing electrical and electronic ystems.

Unit I Introduction to Automotive Electrical and Electronic Systems

Introduction, Why Become an Electrical System Technician?, The Role of Electricity in the Automobile, Introduction to the Electrical Systems, Personal Safety, Tool and Equipment Safety, Lifting the Vehicle, Running the Vehicle While in the Shop, Fire Hazards and Prevention, Hazardous Materials, Electrical System Safety, General Hybrid Electric Vehicle Safety, High- Voltage Service Plug

Unit II Basic Theories.

09 Hours)

Introduction, Basics of Electron Flow, Electricity Defined, Electrical Laws, Types of Current, Electrical Circuits, Kirchhoff 's Laws, Capacitance, Magnetism Principles, Theory of Induction, EMI Suppression, Basic Electrical Troubleshooting, Test Equipment, Multimeters, Lab Scopes and Oscilloscopes, Scan Tools, Static Strap, Memory Keepers, Service Information, Working as an Electrical Systems Technician

Unit III Electrical and Electronic Components

(09Hours)

Introduction, Electrical Components, Electronic Components, Circuit Protection Devices, Circuit Defects, Testing for Circuit Defects, Testing Circuit Protection Devices, Testing and Replacing ElectricalComponents, TestingDiodes, TestingTransistors, DigitalStorageOscilloscope(DS O).

Unit IV Wiring and Circuit Diagrams

(09Hours)

Introduction, Automotive Wiring, Wiring Diagrams, Wire Repair, Replacing Fusible Links, Repairing Connector Terminals, Ground Straps, Reading Wiring Diagrams.

Cables, color codes and terminal designations, harness design, printed circuits, fuses and circuit breakers, switches.

Unit V: Electrical Instrumentation and Accessories

(09 Hours)

Instrument panels, Gauges, Basic information gauges, Indicator and warning devices, driver information centers, general diagnosis and testing Windshield wiper/Washer system, Horn circuit, cruise control system, power lock and power window system, other electronic equipments

Unit VI: Tutorial(15 Hours)

References:

- 1) Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill ISBN10:0074602160.
- 2) Basic Automobile Engineering: C P Nakara: Dhanpatrai publicationISBN-10:9352160983.
- $3) \ Automotive Mechanics: SShrinivas an: Tata McGraw Hill Second edition ISBN 108187433221.$
- 4) Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributers ISBN-10: 8180141969.

VOC 105 Laboratory Course I [ASC/N1402, ASC/N 1403, ASC/N 1418]

(4 Credits 100 Marks)

Course Outcomes:

- Ensure that for routine maintenance and service the correct spare parts andappropriate grade of lubricant, coolants, oils and grease required have beenobtained.
- Ensure all dismantled components (including mechanical aggregates are cleaned and conditioned prior toreassembly).
- 3) Identify and change components requiring change due to continuous wear andtear.
- Comply with organisation's current health, safety and security policies and procedures comply with organisation's current health, safety and security policies and procedures.
- Report any identified breaches in health, safety, and security policies and proceduresto the designatedperson.
- 6) Coordinate with other resources at the workplace to achieve the healthy, safe andsecure environment for all incorporating all government norms esp. for emergency situations like fires, earthquakesetc.
- 7) Test common electrical components.
- 8) Use wiring diagrams to identify circuits and circuitproblems.
- 9) Diagnose common electrical problems.
- 10) Properly repair wiring and connectors.
- 11) Read electrical automotivediagrams.
- 12) Perform troubleshooting procedures using meters, test lights, and jumper wires.

Practice on Basic shopprocedures

Jobsheet

- · Using shop tools and Equipments,
- Connecting and using impact wrench, using a torque wrench, using gear bearingand sealpullers,
- · Removing broken studs andscrews,
- · Removing damagednuts,
- Using acetylene torch for heating, checking and changing respiratory filters,
- · Jump starting a vehicle with a dischargedbattery.

Practice on Measuring system, Measurements and Fasteners

Jobsheet

- Measuring systems, Measurement of mass, Measurement of Length, Measurement of Volume,
- Precision measurement, Measuring space with a feeler gauge and machinistrule.
- · Using an outside micrometer, Interpreting a Micrometerreading,
- Using a dialindicator,
- · Fastners, torque to yield bolts.

Using serviceinformation

Jobshet

· Types of serviceinformation,

- · Using Owners manual, Manufacturer service manual,
- · Troubleshooting and Diagnostictable,
- Using generic service manuals, electronic service information, computersoftware, servicebulletins,
- Labour estimating guides,
- · Using Vehicle service decals and warninglabels,
- Vehicle identificationnumber.

Engine oil and lubrication systems

Job sheet

- Performance on engine oil and filter replacement of any automobileafter replacement perform oil leakdiagnosis,
- · Oil Pressure Indicatorsdiagnosis,
- · Resetting change oil warningmessages,
- · Diagnosis of excessive oilconsumption,
- · Oil pressuretesting
- · Oil pump service, oil jetvalves.

Engine coolant and Cooling system

Jobsheet

- · Performance on cooling systemsMaintenance
- Checking coolantlevel
- · Hose inspection, Drive Belt inspection and tensiontesting
- Coolant testing
- · Coolant contamination
- · Cooling systemdiagnosis
- · Draining the coolingsystem
- · Filling the coolingsystem
- Cooling systemflushing
- Diagnosis of improper operating temperatures, Thermostat testing, Pressurecap diagnosis and coolingsystem
- · Leak diagnosis, cooling systemservice.

Intake and Exhaust systemMaintenance,

Jobsheet

- Diagnosis and Service. Perform Intake system Maintenance, Intakesystem diagnosis, Intake system service,
- Exhaust system Maintenance, Exhaust system Diagnosis, Exhaustrestriction diagnosis, converter diagnosis, exhaust systemservice.

Special Electrical Tools and Procedures

Job Sheet

- Using ohm's Law to Calculate ElectricalProperties
- Meter SymbolInterpretation
- Using a TestLight
- Use of aVoltmeter
- Use of anOhmmeter

Basic Electrical Troubleshooting and Service.

Job Sheet

- Testing for an OpenCircuit
- Testing for a Short toGround
- Testing Circuit ProtectionDevices.
- TestingSwitches.
- Testing aDiode.
- Using a DSO on Sensors and Switches

Wiring Repair and Reading Circuit Diagrams

Job Sheet

- Part Identification on a WiringDiagram
- Using a ComponentLocator
- Using a WiringDiagram
- · Soldering CopperWires

VOC 106 Laboratory Project-I

(10 Credits 200 Marks)

The semester end Laboratory Project will act as primary mechanism of the Institute to provide students with an opportunity to gain on hand experience through effective, efficient, and practical application of what they have studied through the semester.

Course Outcomes:

- · Critical thinking in problem solving
- Presentation and communication skills
- Report organization and writing skills
- · Independent learning and information integration skills
- · Project management skill
- Work as an individual, with support from a supervisor, formulating solutions to dayto-day problems by integrating knowledge and experience gained on the course and outside the course.

Activity

Students or group of students (max.04) have to prepare a comprehensive project proposal based on theory and laboratory course, they will be covering during the semester project under supervision of project guide. After approval of the proposal by the Director, students will be allowed to work on the project. Working Model/ Demonstration model of the project along with the project report have to be submitted to the project guide before the semester end examination. Final evaluation will be based on power-point presentation, demonstration and viva-voce examination.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO./SYLLABUS./FACULTY OF SCIENCE TECH./B.Voc./37/2021.

It is hereby inform to all concerned and that, on the recommendation of Ad-hoc Board in Vocational Studies & subsequently, Dean, Faculty of Science & Technology the Hon'ble Vice Chancellor has accepted the following Curriculum of B.Voc. & M.Voc. Courses of Choice Based Credit and Grading System under the faculty of Science & Technology in his emergency powers under section 12(7) of the maharashtra public univerities act, 2016 on behalf of the academic council as appended herewith.

Sr.No.	Name of the B.Voc & M.Voc Syllabus	Semester				
1.	B.Voc. Industrial Automation	Semester-VI-Pattern-2018				
2.	B.Voc. Industrial Automation	Semester-VI- Uniform Pattern-2019				
3.	B.Voc. Industrial Automation	Semester-V- Uniform Pattern-2019				
4.	B.Voc. Industrial Automation	Semester-IV- Uniform Pattern-2019				
5.	B.Voc. Industrial Automation	Semester-VI-Pattern-2020				
6.	B.Voc. Industrial Automation	Semester-V- Pattern-2020				
7. B.Voc. Industrial Automation		Semester-IV-III and II - Pattern-202				
8. M.Voc. Industrial Automation		Semester-IV-III and II - Pattern-202				
9. B.Voc. Automobile		Semester-VI-Pattern-2018				
10. B.Voc. Automobile		Semester-VI- Uniform Pattern-2019				
11.	B.Voc. Automobile	Semester-V- Uniform Pattern-2019				
12.	B.Voc. Automobile	Semester-IV- Uniform Pattern-2019				
13. B.Voc. Automobile		Semester-VI- Pattern-2020				
14.	B.Voc. Automobile	Semester-V- Pattern-2020				
15.	B.Voc. Automobile	Semester-IV,III and II Pattern-2020				
16.	M.Voc. Automobile Technology	Semester-IV,III and II Pattern-2020				

This is effective from the <u>Academic Year 2021-2022</u> and onwards.

This B.Voc. & M.Voc. Curriculum with Structure is also available on the University website www.bamu.ac.in

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University campus, Aurangabad-431 004. Ref. No. SU/B.Voc.Syll./2021/3)

Date: 31.05.2021

Deputy Registrar, Academic [Syllabus] Section.

Copy forwarded with compliments to :-

- The Director, Deen Dayal Upadhyay KAUSHAL Kendra,
 Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- The Principals, affiliated concerned Colleges,
 Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- 3] The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.
 Copy to:-
- 1] The Director, Board of Examinations & Evaluation,
- 2] The Section Officer, [M.Voc & B.Voc. Unit] Examination Branch,
- 3] The Section Officer, [Eligibility Unit],
- 4] The Programmer [Computer Unit-1] Examinations,
- 5] The Programmer [Computer Unit-2] Examinations,
- 6] The In-charge, [E-Suvidha Kendra],
- 7] The Public Relation Officer,
- 8] The Record Keeper,
 Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

JK29052021*/-

ORARATHWADA UNIVERSITA P



Syllabus Of
B.Voc. Automobile
Semester – IV –III & II
(Pattern-2020)

[Effective from 2021 & 2022 & onwards]

5/3/2021

B.VOC Automobile

Semester IV Pattern 2020

Professor Mahendra D. Shirsat Director, Deen Dayal Upadhyay Kaushal Kendra, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (MS) -431 004



	SEI	MEST	ER – IV					
	General A	caden	nic Com	ponent				
			Contact Hours Per Week			ion	Total Marks	Credit
Sr. No.	Name of the Course	L	Т Р		CIA	SEE		
AUVOC401	Entrepreneurship Development	3	1	0	20	80	100	4
AUVOC 402	Autotronics	3	1	0	20	80	100	4
	Elective -I (any one a	mong	AUVO	C403A :	and AUV	OC403B) 80	100	4
AUVOC 403A	Automotive Fault Diagnostics							
AUVOC 403B	Motor Vehicle Act and Regulations	3	1	0	20	80	100	4
Skill Developmen	t Component							
	Elective -II (any one amo	ng Al	VOC40	4A and	AUVOC	(404B)		
AUVOC 404A	Hybrid Vehicles	3	1	0	20	80	100	4
AUVOC 404B	Vehicle Testing	3	1	0	20	80	100	4
AUVOC 405	Laboratory Project-IV	-	-	8	-	100	100	4
AUVOC 406	Major Project-IV/Industrial Project-IV	-	-	*	3	200	200	10
TOTAL	•						700	

Professor Mahendra D. Shirsat Deen Dayal Upadhyay Kashal Kendra, Dr. Bebacahob Ambedkar Marathwada University, Autangabad (MS) 431 004



AUVOC401: Entrepreneurship Development

(4 Credits: 100 Marks)

Learning Objectives:

- To provide the students with basic traits of entrepreneurship
- 2. To introduce students with entrepreneurial environment
- 3. To equip students with basic tools for business plan preparation
- 4. To equip students with concepts of launching and management of small business

Course Outcomes:

On Completion of the course, students should be able to -

- 1. Explain key concepts underpinning entrepreneurship and its application in the recognition and exploitation of product/ service/ process opportunities
- 2. Describe Key concepts underpinning innovation and the issues associated with developing and sustaining innovation within organizations
- 3. Plan creative strategies for pursuing, exploiting and developing new opportunities
- 4. Analyze basic Issues associated with securing and managing new business ventures

Course Contents:

Unit- 1: Entrepreneur

(09 Hrs)

Entrepreneurship concept, Entrepreneurship as a career, Required Personality traits for an entrepreneur, Characteristics of an Entrepreneur, Functions of an Entrepreneur, Entrepreneur vs. Manager, Intrapreneur/Corporate Entrepreneur

Unit- 2: Entrepreneur Development

(09)

Hrs

Types of Entrepreneurs, Motivating Factors to Become Entrepreneur, Entrepreneurial Competencies, Requirements for Successful entrepreneur, Entrepreneur and Economic Development

Unit- 3: Entrepreneurial Environment

(09 Hrs)

Business Environment, Role of Family and Society, Challenges, Entrepreneurship Development Training and Other Support Organizational Service, Startup Accelerators, Students Standbox and Business Labs, Crowd Funding, Venture Capital, Co-Working Spaces, Boot Camps, Central and State Government Policies and Regulations

Unit- 4: Business Plan Preparation (09 Hrs)

Sources of Product for Business, Pre-feasibility Study, Criteria for Selection of Product, Ownership, Capital, Budgeting Project Profile Preparation, Matching Entrepreneur with the Project, Feasibility Report Preparation and Evaluation Criteria

Unit-5: Launching and Management of Small Business

(09

Finance and Human Resource Mobilization Operations Planning, Market and Channel Selection, Growth Strategies, Product Launching, Monitoring and Evaluation of Business, Preventing Sickness and Rehabilitation of Business Units, Effective Management of Small Business

Unit 6: Tutorial (15 Hrs)

Assignments; Seminars; Exercises based on Unit 1 to 5

Reference:

Text:

- Entrepreneurship: R. D. Hisrich, M. P. Peters, D. A. Shepherd; McGraw Hill India; ISBN: 9789353163457
- Entrepreneurship Development: E. Gordon, K. Natarajan; Himalaya Publishing House; ISBN: 9789352025404
- Entrepreneurship Development: S. S. Khanka; S. Chand and Company; ISBN: 8121918014 Suggested Reading:
- Dynamics of Entrepreneurial Development and Management: V. Desai; Himalaya Publishing House; ISBN: 9788184884975
- Entrepreneurial Development: N. P. Srinivasan & G.P. Gupta; S. Chand & Sons, ISBN 9788170148012

AUVOC 402 Autotronics Qualification Pack ASC/Q1412: Service Supervisor NOS: ASC/N0001, ASC/N0002, ASC/N0003, ASC/N0005, ASC/N1424 (04 credits -100 Marks)

Learning Objectives:

i. To understand the electronics pertaining to engine systems.

ii. To Select sensor for appropriate application of vehicle.

iii. To Carry out on board diagnostics of sensors and allied systems.

Course Outcomes:

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

CO1	Describe the Electronics system for engine.
CO2	Demonstrate the usage of intelligent sensors such as MAP, CKP,CMP, Lambda.
CO3	Analyze the auxiliary system for electronics troubleshooting.
CO4	Scan the engine for diagnosis by using Engine scanner.

UNIT I: Basic Electronics

(9 Hours)

Development of automobile electrical and electronic system, A short history, safe working practices, basic electrical and electronic principles, electronic components and circuits, basic tools and equipment, multimeter, use of multimeters.

UNIT II: Electronic system for Engine

(9 Hours)

Electronic control of carburetion, Engine fueling and exhaust emissions, Electronic Ignition, Programmed Ignition, Distributorless Ignition, complete vehicle control system, interfacing technique for engine control

UNIT III: Electronics for Auxilliaries

(9 Hours)

Lighting Circuits, Windscreen washers and wipers, lighting fundamentals, lighting circuits, electronic climate control, visual displays, electronic power steering, electronic stability programme

UNIT IV: Sensors

(9 Hours)

Sensors for intelligent transport system, sensors for occupant safety, CKP Sensors, MAP sensors, CNP sensors, Lamda sensors, rain sensor, cruise control, braking control, traction control, steering and stability, ABS system

UNIT V: Electrical and Electronic Components

(9 Hours)

Introduction, Electrical Components, Electronic Components, Circuit Protection Devices, Circuit Defects, Testing for Circuit Defects, Testing Circuit Protection Devices, Testing and Replacing Electrical Components, Testing Diodes, Testing Transistors, Digital Storage Oscilloscope (DSO).

UNIT-VI Tutorials, case studies and presentation based on Module I to V (15 Hours)

References:

- 1. William B. Ribbens, Understanding Automotive Electronics, 5th edition, Newnes
- 2. Ronald k. Jurgen, Automotive Electronics Handbook, 2nd edition, McGraw-Hill
- 3. Rajkamal, "Embedded System Architecture, Programming, Design", Tata McGraw Hill,2003.
- 4. Daniel W. Lewis "Fundamentals of Embedded Software", Prentice Hall of India.
- 5. Holman, J.P., Experimental methods for engineers, McGraw-Hill Raman, C.S., Sharma, G.R., Mani.
- V.S.V., Instrumentation Devices and Systems, TataMcGraw Hill, New Delhi.

AUVOC 403 A Engine Diagnostic and Troubleshooting

Qualification Pack ASC/Q1412: Service Supervisor NOS: ASC/N0001, ASC/N0002, ASC/N0003, ASC/N0005, ASC/N1424

(04 credits - 100 marks)

Learning Objectives:

- i. To understand the fault finding of engine and procedure to repair fault.
- ii. To give remedies for various troubleshooting or faults
- iii. To recognize the engine management system and its importance.

Course Outcomes:

CO1 Identify and interpret engine performance concern; determine necessary action.				
CO2	Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.			
CO3	Diagnose unusual engine noise or vibration concerns; determine necessary action.			
CO4	Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.			

Contents

UNIT I: Introduction

(9 Hours)

Introduction, Diagnostic process, Diagnostics on paper, Mechanical diagnostic techniques, Electrical diagnostic techniques, Fault codes, Systems, On- and off-board diagnostics, Data sources, Basic equipment, Oscilloscopes, Scanners/fault code readers, Engine analysers

UNIT II: Diagnostic Technique

(9 Hours)

Oscilloscope diagnostics- Introduction, Sensors, Actuators, Ignition system, On-board diagnostics – a first perspective, What is on-board diagnostics?, Petrol/gasoline on-board diagnostic monitors, On-board diagnostics – a second perspective

UNIT III Diagnosing Engine Systems

(9 Hours)

Introduction, Engine operation, Diagnostics - engines, Fuel system, Diagnostics - fuel system, Introduction to engine management, Engine management

UNIT IV: Diagnosing Injection Systems

(9 Hours)

Ignition, Diagnostic – ignition systems, Emissions, Diagnostics – emissions, Fuel injection, Diagnostics – fuel injection systems, Diesel injection, Diagnostics – diesel injection systems, , Diagnostics – combined injection and fuel control systems.

UNIT V: Engine management and fault finding information

(9 Hours)

Air supply and exhaust systems, Diagnostics – exhaust and air supply, Cooling, Diagnostics – cooling, Lubrication, Diagnostics – lubrication, Batteries, Diagnosing battery faults, Starting, Diagnosing starting system faults, Charging, Diagnosing charging system faults

UNIT VI: Presentation, case studies, assignments and tutorials based on module I to IV

(15 Hours)

References:

1. Advanced Automotive Fault Diagnosis, Tom Denton, Elsevier Butterworth-Heinemann, ISBN-13:

978-0-75-066991-7

- 2. Automotive Engines, William H. Crouse (Author), Donald Anglin (Author), Donald L. Anglin, 2. Automotive Engines, William H. Crouse (Autor), Bohad E. Angini, McGrawHill Education (ISE Editions); (1994), ISBN-10: 0071138846, ISBN-13: 978-0071138840.

 3. Automobile Technology, Volume II by Kripal Singh, 2009

 4. Automobile engineering, Dr. R.K.Singhal ISBN:9788185749488 Reprint 2015

- 5. Automobile engineering, Dr. R.K.Rajput ISBN:81700089913 Reprint 2015

VOC-602 Motor Vehicle Act and Regulations

Learning Objectives:

The course should enable students:

- 1. Implement concept of Taxation and Insurance of Vehicle Registration.
- 2. To gain knowledge of managing the organization, personal, and operational requirements for successful transportation department
- 3. To gain knowledge of theories of studying traffic flow and transport demand and supply.

Course Outcomes:

After completion of the course, students are expected to be able to:

CO1	Interpret the Motor Vehicle Act and Traffic Rules.
CO2	Select the suitable mode of transportation and vehicle as per requirement.
CO3	Implement the business of buying and selling the vehicles.

UNIT- I: Introduction to Motor Vehicle Act

(09 Hours)

Short titles and definitions, Licensing of Drivers and conductors of Motor Vehicle: laws governing use of motor vehicle licensing and registration, traffic rules, signals and control, different types of forms, government administrative structure.

UNIT-II: Construction of Motor Vehicle,

(09 Hours)

Construction of Motor Vehicle: Overall dimensions, General provision regarding construction and maintenance of motor vehicle, Power of state and central government to make rules.

UNIT III: Taxation and Insurance

(09 Hours)

Taxation: Objectives, Basis of taxation, Methods of levying tax to motor vehicle, Tax structure for motor vehicles in Maharashtra, Modes of payment of the tax, Tax exemption, Refund of tax.

Insurance: Types of Motor Vehicle insurance — Comprehensive and Third Party insurance, Procedure to claim compensation, Motor Accident Claim Tribunal, Liability without fault in certain cases, Provision of compensation in Hit and Run case.

UNIT-IV: Estimation and Valuation of Vehicle

(09 Hours)

Role of surveyor: Eligibility for surveyor, Procedure to obtain surveyor's license, Duties and responsibilities of Surveyor. Procedure of accident survey and valuation of vehicle, Accident survey report. Buying a new vehicle: Factors to be considered -Ex-showroom price and on road price, use of vehicle, when and where to buy. Buying used vehicles: When and where to buy: Dealers, used car firms, Private sellers, Garages, Auctions Sale of used vehicles: Procedures -Before, During and after sale of vehicle, Auctions, Garages, Private sale, preparing the vehicle documents, selling price

UNIT-V: Passenger and Goods Transport Operation

(09 Hours)

Terms used in transportation: Transport vehicle, Public service vehicle, Goods vehicle, Public place, Depot, Route, Trip, crew, Time table, Vehicle schedule, Fare. Modes of transportation and their comparison. Basic elements in Transport Management — Market Potential, Selection of vehicle, Organization setup, Legal compliance, Policies of transport organization towards Passenger and employee service, Bus and Crew scheduling: Basic factors in bus, crew (staff) scheduling, Bus depot layout: Site selection for depot, Layout,

Passenger amenities and infrastructural facilities required, **Record Keeping**: Log book, Trip operational sheet, Vehicle ledger, Truck history card, Monthly operational sheet, Goods consignment note, various types of bookings

UNIT-VI: Assignments / seminars / case studies on Module -I to Module - V (15 Hours)

References:

- Passenger Amenities in STU, Sudarsanam,P. Manual of Central Institute of Road Transport, Pune.
- 2. Bus station Management, Sudarsanam, P. Manual of Central Institute of Road Transport, Pune.
- Bus and Crew Scheduling, Sudarsanam,P. Manual of Central Institute of Road Transport, Pune.
- Central Motor Vehicle Rules 1989, Ministry of Road Transport and Highways, Government of India.
- Motor Vehicle Act and Transport Management, Khilery, V.S; Sharma, Satpal; Gupta, Shaman, Ishan Publications, 1st edition ISBN No.13: 978-9381551950
- 6. Bus operation, Kitchin, L. D. Iliffe and Sons Ltd. London, ISBN No.B0007J9ZJ6
- Bus and Coach Operation, Rex W., Faulks, Butterworth-Heinemann, ISBN No.9780408028103

SOFTWARE/LEARNING WEBSITES

- a. https://transport.maharashtra.gov.in/1035/Home
- b. https://parivahan.gov.in/sarathiservice7/stateSelection
- c. https://parivahan.gov.in/sarathiservice7/sarathiHomePublic
- d.https://parivahan.gov.in/vahanservice/vahan/ui/statevalidation/homepage.xhtml

AUVOC 404A Hybrid and Electric Vehicles

(4 Credits 100 Marks)

Learning Outcomes:

To introduce students with Hybrid Electric Vehicles along with key important concepts like Drive train, propulsion unit, energy storage and energy management strategies.

Course Outcomes

- 1 Explain the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals.
- 2 Explain plug in hybrid electric vehicle architecture, design and component sizing and the power electronics devices used in hybrid electric vehicles.
- 3 Analyze various electric drives suitable for hybrid electric vehicles.
- 4 Discuss different energy storage technologies used for hybrid electric vehicles and their control.
- 5 Demonstrate different configurations of electric vehicles and its components, hybrid vehicle configuration by different techniques, sizing of components and design optimization and energy management.

Contents:

Unit I: Introduction to Hybrid Electric Vehicles:

(9 Hours)

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

Unit II : Hybrid Electric Drive-trains: :

(9 Hours)

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Unit III: Electric Propulsion unit: :

(9 Hours)

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

Unit IV: Energy Storage::

(9 Hours)

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

Unit V: Energy Management Strategies: :

(9 Hours)

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

Case Studies: Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).

Unit:VI: Assignment and Tutorials

(15 Hours)

- 1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003 ISBN 0203009398, 9780203009390.
- 2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004, ISBN 0-8493-3154-4.
- 3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003, ISBN: 978-1-119-94273-3.

AUVOC 404B

Vehicle Testing

(04 credits - 100 marks)

Course Outcomes:

After completion of the course, students are expected to be able to:

CO1	Classify various vehicle approval methods.	
CO ₂	Describe vehicle testing procedures.	
CO3	Measure engine pollution using exhaust gas analyzer.	
CO4	Describe Automobile Testing Standards.	

UNIT: I Engine Testing and Diagnosis

(9 Hours)

Need of vehicle testing and homologation, Vehicle testing organizations, Hierarchy of testing: Individual component approval, System level approval and Whole vehicle approval. Type Approval & Conformity of Production tests.

UNIT: II Vehicle System Testing

(9 Hours)

Brake Test, Acceleration Test, Retardation Test, Chassis Dynamometers, Two wheeler chassis dynamometer, Ultrasonic fuel injector test, gradient test, crash worthiness test simulation, Methods for evaluating vehicle performance- energy consumption in conventional automobiles, performance, Gradability test, Turning circle diameter test, Steering Impact test, Steering effort test

UNIT: III Emission and Pollution Testing

(9 Hours)

Pollution due to exhaust gases, gas analyzer, 4 gas analyzer, Diesel smoke meter, Orsat apparatus, performance, emission and fuel economy, Operation of full load and part load conditions, effect of vehicle condition.

UNIT: IV Automobile Testing standards

(9 Hours)

Introduction, overview and study of testing standards like; Bharat Stage, AIS testing standards, Euro Standards, SAE standards. ISO26262 standards for functional safety of electrical and/or electronic systems in automobiles.

UNIT -V Engine Performance Systems

(9 Hours)

Ignition Systems, Fuel System, Air Induction System, Emission Control Systems, Engine Control Systems, On-Board Diagnostic Systems, System Operation, OBD-II, Monitoring Capabilities, OBD-II, Self-Diagnostics, Basic Diagnosis of Electronic Engine Control Systems, Diagnosing OBD-II Systems.

UNIT VI: Tutorials, case studies and presentation based on Module I to IV (15 Hours)

- 1. Raymond M. Brach and R. Matthew Brach, "Vehicle Accident Analysis and Reconstruction Methods", SAE International, 2011
- 2. J. G. Giles Vehicle operation and performance, Wildlife Publications, London,
- 3. W. H. Crouse and L. Anglin Motor vehicle inspection, McGraw Hill Book Co.
- 4. Dr. N.K.Giri- Automotive technology Khanna publishers, 2009
- Ulrich Seiffert and LotharWech, "Automotive Safety Handbook", SAE International, 2007
- 6. ISO Standards, ICS: 43.020, 43.040, 43.100

AUVOC 405 Laboratory Course IV

Qualification Pack ASC/Q1412: Service Supervisor

NOS: ASC/N0001, ASC/N0002, ASC/N0003, ASC/N0005, ASC/N1424

(At least 60% experiments have to be performed)

Course Outcomes:

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

CO1	Diagnoses engine faults, identify correct cause and apply remedies to remove fault.				
CO2	Diagnoses cooling system faults identify correct cause and apply remedies to remove fault.				
CO3	Diagnoses lubrication system faults identify correct cause and apply remedies to remove fault.				
CO4	Diagnoses fuel supply system faults identify correct cause and apply remedies to remove fault.				
CO5	Diagnoses electrical system faults identify correct cause and apply remedies to remove fault.				

Course Content:

Jobsheets

- 1. Prepare a service work order based on customer input, vehicle information, and service history.
- 2. Gather service information about a vehicle and its engine and related systems.
- 3. Identify and interpret engine concerns; inspect an engine assembly for fuel, oil, coolant, and other leaks;
- diagnose engine noises and vibrations; and diagnose the cause of excessive oil consumption, unusual
- engine exhaust color, odor, and sounds.
- 4. Locate and interpret vehicle and major component identification numbers.
- Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- 6. Perform cylinder power balance test; determine necessary action.
- 7. Perform cylinder cranking and running compression test; determine necessary action.
- 8. Perform cylinder leakage test; determine necessary action.
- 9. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.
- 10. Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.
- 11. Verify engine operating temperature; determine necessary action.
- 12. Perform engine cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.
- 13. Verify camshaft timing according to the manufacturer's specifications.
- 14. Retrieve and record stored OBD II diagnostic

trouble codes, OBD monitor status, and freeze frame data, and clear codes when applicable.

- 15. Diagnose the causes of emissions or driveability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.
- 16. Diagnose emissions or driveability concerns without stored diagnostic trouble codes; determine necessary action.
- 17. Adjust valves on engines with mechanical or hydraulic lifters.
- 18. Remove and replace timing belt; verify correct camshaft timing.
- 19. Remove and replace thermostat and gasket/seal.
- 20. Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control

devices; perform necessary action.

- 21. Perform common fastener and thread repairs, to include: remove a broken bolt, restore internal and
- external threads, and repair internal threads with threaded insert.
- 22. Perform engine oil and filter changes.
- 23. Identify hybrid vehicle internal combustion engine service precautions.

AUVOC406 Major Project-III/Industrial Project-III

The Major Project-III/Industrial Project-III is one of the primary the mechanisms used by the College to provide the students with an opportunity to gain experience in the practical, effective, efficient, and beneficial application of what you have been studying for the past several years.

Course Outcomes:

- Critical thinking in problem solving
- · Presentation and communication skills
- · Report organization and writing skills
- · Independent learning and information integration skills
- · Project management skill
- Work as an individual, with support from a supervisor, formulating solutions to dayto-day problems by integrating knowledge and experience gained on the course and outside the course.

Activity

Students are expected to go through review of literature on a particular technical aspect and/or pay industrial visit to identify a point of further study and investigation. The student (or group of students), thereafter, would propose a subject on basis of literature review and/or industrial orientations and will have to present a short seminar on his/her proposal to the board of examiners constituted by faculties of the department. If approved, he/she will be allowed to work on that particular project. Within a week after this approval, the student(s) will have to finalize their topic/subject of project and duly officiate it.

During phase - I of Industrial Project, it is expected that the student(s) will-

- i. Build up a concrete fundamental of the concept on which they are going to work
- ii. Carry out thorough literature survey to find out scope of work in the particular field
- iii. Thereby, finalizing the topic of further study/investigation and finally, draft a systematic experimental plan to achieve projected goal
- iv. Deliver regular presentations
- Systematically document the above activities in bound volume and submit one copy to the department, one copy to concerned faculty and retain one copy with him/her.

5/3/2021

B.VOC Automobile

Semester III Pattern 2020

Paculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

Professor Mahendra D. Shirsat Director, Deen Dayal Upadhyay Kaushal Kendra, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (MS) -431 004



SEMESTER - III General Academic Component Total Credit Contact Hours Evaluation Per Week Scheme Marks SEE CIA Name of the Course No. 80 100 20 4 1 0 AUVOC301 Energy and Environment 100 20 80 4 3 0 Suspension and Steering AUVOC302 System Elective -I (any one among AUVOC303A and AUVOC303B) 100 4 20 0 3 1 AUVOC303A Tires and Braking system 100 20 80 4 Automotive Fuel and Emission AUVOC303B Control System Skill Development Component Elective -II (any one among AUVOC304A and AUVOC304B) 80 100 0 20 4 Automobile Transmission AUVOC304A System Automobile Body Repair 3 1 0 20 80 100 4 AUVOC304B Technology Laboratory Project-III 100 4 AUVOC305 Major Project-III/Industrial Project-III 200 200 10 AUVOC306 TOTAL

Arofessor Mahendra D. Shirso: Director, Desn Dayal Upadhiley Kaushni Kendra, Dr. Babasacheb Ambedikar Marathwirda University, Aurangabed (MS) 431 004



AUVOC301: Energy and Environment

(4 Credits: 100 marks)

Learning Objectives

To develop basic idea of energy resources, allied techniques and conscience for environment among students

Course Outcomes

On completion of the course, students should be able to -

- 1. Describe basic concepts of conventional and non-conventional energy
- 2. Recognize elements of primary non-conventional energy resources
- 3. Correlate pollution, role of human being, and threats to environment
- 4. Discuss ethical and legislative issues related to environment
- 5. Express the needs and basic routes towards environment sustainability

Course Contents

Unit 1: Fundamentals of Energy

(9 Hours)

Global energy consumption profile, Oilcrisis of 1973, Classification of energy resources, Consumption trends of primary energy resources, Importance of non-conventional energy resources, Energy chain, Common forms of energy, Advantages and disadvantages of conventional energy resources, Salient features of non-conventional energy resources, environmental aspects of energy, Sustainable development, Energy density of fuels

Principles of energy conservation, Energy conservation ACT 2001, General electrical ECOs, Cogeneration, Need of energy storage, Overview of energy storage methods

Unit 2: Non-conventional Energy Sources

(9 Hours)

Solar energy basics, Solar thermal systems, Basics of solar photovoltaic; Wind Energy fundamentals, Wind turbine types, Storage of Wind Energy, Environmental aspects of wind energy generation, Biomass energy, Usable form of biomass-composition and fuel property, Biomass resources and conversion technologies, Urban waste to energy conversion, Biogas production from waste biomass.

Small Hydro resources, advantages and disadvantage, Layout, Water Turbines, Generation, Basics of financial andeconomic evaluation.

Unit 3: Environment Pollution and Waste Management (9 Hours)

Pollution- Air, Warter, Noise and Soil Pollution (causes, Effect, Control Measures); Nuclear hazards, Role of an individual in preventing pollution, Climate Change, Global Warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents; Disaster management.

Waste Management – Solid Waste Management, Causes, Effects and control measures of Urban and Individual waste, Municipal Solid Waste, Vermicomposting, Hazardous waste.

Unit 4: Social Issues and Environment

(9 Hrs.)

Human Population – Population growth, Global profile, Urbanization, Environmental and Human health, Values and Human rights.

Sustainable development, Waste conservation, Wasteland reclamation, Consumerism and waste products.

Environmental Ethics- Issues and possible solutions

Unit 5: Environment Regulations

(9 Hrs.)

Environmental Acts - Environment Protection, Air (Prevention and Control of Pollution Act), Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environment legislation, Public Awareness.

Environment Management Standards – ISO 14000, BHARAT and EURO Stages, Environmental Clearance/ Permission for establishing Industries

UNIT-VI Tutorials, case studies and presentation based on Unit I to V (15 Hours)

References:

Text:

- Textbook for Environmental Studies-ErachBharucha for University Grants Commission; University Press; 2004New Delhi, India
- 2. Environmental Management- N. K. Uberoi; Excel Books;2013New Delhi;India
- Non-Conventional Energy Resources; B. H. Khan; 2006 Tata McGraw-Hill Education; India

Suggested Reading:

1. Environmental Science and Engineering-Glynn Henry J., Gary W. Heinke; 2004.;

Pearson Education, Inc, NY
2. Non-Conventional Energy Sources- G. D. Rai , 2006; Khanna Publishers, India

Web:

1.https://onlinecourses.nptel.ac.in/noc18 ge09/preview

- 2. https://nptel.ac.in/courses/127106004/
- 3. https://nptel.ac.in/courses/122106030/

AUVOC302- Suspension and Steering System (04 credits – 100 marks)

(Qualification Pack Code: ASC/Q 1404, Job Role Auto Service Technician Level 6) (Corresponding NOS Code: ASC/N1407, ASC/N 1409)

NOS	Description			
ASC/N1407	Carryout advanced diagnosis of vehicle for engine and other mechanical repairs requirements.			
ASC/N 1409	Carryout servicing, repairs and overhauling of vehicle (Advanced)			

Learning Obectives:

- i. To introduce the construction and working of steering system.
- ii. To introduce the construction and working of suspension system
- iii. To make student recognize the significance of steering and suspension system in automobiles

Course Outcomes:

The course should enable students:

- 1. Explain the purpose function, objective and requirements of suspension system.
- 2. Name and describe the different types of suspension system currently being used and how they function.
- 3. Explain the air bag system components and its operation.
- 4. Describe the steering columns and linkages, different steering system.

Course Content:

UNIT - I: Introduction to Suspension system

(09 Hrs.)

Introduction, History, Functions and objective of suspension system, Requirements of suspension system, Elements of suspension system, Vehicle axis system, springs, Dampers(or shock absorbers), shock absorber and struts, ball joints.

UNIT - II: Suspension system

(09 Hrs.)

Types of suspension systems, Conventional or dependent suspension system, Independent suspension system: Short, Long-Arm (SLA) Front suspension system, Advantages and disadvantages of Front suspension system, MacPherson strut-Front suspension System Design, Torsion bar suspension, Live axle rear suspension system, Semi-Independent Rear suspension system, Independent rear suspension system and its Advantages disadvantages, Curb riding height and caster angle, Continuously variable road sensing suspension, Air suspension system.

UNIT - III: Supplemental Restraint System in Steering

(09 Hrs.)

Introduction, passive seat belt restraints, Air bag system components, Air bag system operation, Multistage air bag deployment, Side impact air bags, smart air bag systems, seat belt pretensioners, Supplemental Restraint System maintenance, Supplemental Restraint System diagnosis, Air bag system service

UNIT - IV: Steering columns and linkages, Manual and Power steering (09 Hrs.)

Introduction, Functions and requirements, steering system components and linkages, Steering geometry, Steering column design, various types of steering gears: Manual reciprocating ball steering gears, Manual Rack and pinion steering gear, Power reciprocating ball steering gears, Power rack and pinion steering gear, steering gear ratio, Types of steering system: Two wheel steering, four wheel steering, Power rack and pinion steering, Electronic Power steering

UNIT -V Wheel Alignment and Balancing

(09 Hrs.)

Introduction, Wheel Alignment Theory, Importance of Four Wheel Alignment, Rear Wheel Alignment and Vehicle Tracking Problems, Types of Wheel Alignment, Computer Alignment Systems, Camber Fundamentals, Driving Conditions Affecting Camber, Caster Fundamentals Safety Factors and Caster, Steering Terminology, Steering Axis Inclination (SAI), Definition SAI Purpose, SAI and Safety Factors, Scrub Radius, Wheel Setback, Toe Definition, Toe Setting for Front-Wheel-Drive and Rear-Wheel-Drive Vehicles, Toe Adjustment and Tire Wear Turning Radius Rear Wheel Alignment, Static Wheel Balancing, Dynamic Wheel Balancing.

UNIT - VI Tutorials, case studies and presentation based on Unit I to V (15 Hours)

- 1. Automobile Technology, Service and Maintenance by Don Knowles ISBN 81-315-1415-3
- 2. Automobile Technology, Volume II by Kripal Singh, 2009
- 3. Automobile engineering, Dr.R.K.Singhal ISBN:9788185749488 Reprint 2015
- 4. Automobile engineering, Dr.R.K.Rajput ISBN:81700089913 Reprint 2015

AUVOC303A: Tires and Braking System [ASQ/C1404, ASC/N 1407, ASC/N1409, ASC/N0001, ASC/N0002, ASC/N0003]

(Qualification Pack Code: ASC/Q 1404, Job Role Auto Service Technician Level 6) (Corresponding NOS Code: ASC/N1407, ASC/N 1409)

NOS	Description
ASC/N1407	Carryout advanced diagnosis of vehicle for engine and other mechanical repairs requirements.
ASC/N 1409	Carryout servicing, repairs and overhauling of vehicle (Advanced)

Learning Objectives:

- i. To introduce the construction and working of Tires and braking system
- ii. To Select appropriate tyre for automobile
- iii. To make student recognize the significance of tires and braking system in automobiles

Course Outcomes:

- 1) Perform the work operations required to change a vehicle's wheels/tires.
- 2) Functionality and design of various tires.
- 3) Explain the construction and operation of braking systems and components.
- 4) Explain the principles and components of an ABS system and electrical components.

UNIT I: Tires Design

(09 Hours)

Introduction, Tire Design, Tires Ply and Belt Design, Tire Ratings, All season and Specialty Tires, Replacement Tires, Run Flat Tires, Tire Valves, Compact Spare Tires, Tire Contact Area, Tire Placard and Inflation Pressure, Tire Pressure and Monitoring System, Tire Motion Forces.

UNIT II: Wheels and Hubs

(09 Hours)

Introduction, Wheel Rims, Static Wheel Balance Theory, Dynamic Wheel Balance Theory, Wheel Bearing, Wheel Bearing Seals, Wheel Bearing Hub Assemblies, Rear Axle Bearings, Bearings Lubrication.

UNIT III: Conventional Brake System

(09 Hours)

Introduction, Hydraulic Principle, Brake fluids, Master Cylinders, Drum Brakes, Disc Brakes, Brakes lines Hoses and Valves, Vaccum Brake Boosters, Hydro-Boost Brake System, Parking Brakes.

UNIT IV: Antilock Brake system

(09 Hours)

Introduction, Antilock Brake System Principles, ABS operation, Four-Wheel ABS with High pressure Accumulator, ABS with low pressure Accumulator

(09 Hours)

UNIT V: Frames and Frame Damages

Introduction, Types of Frames and Frame Construction, Unitized Body Design, Vehicle Directional Stability, Vehicle Tracking, Types of Frame Damage Realignment Basics, Unibody/Frame Straightening Equipment, Straightening and Realigning Techniques, Measuring When Pulling, Planning the Pull

UNIT - VI Tutorials, case studies and presentation based on Unit I to V (15 Hours)

- 1) Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill 10thedition ISBN: 9780070634350.
- 2) Automotive Mechanics: S Shrinivasan: Tata McGraw Hill Second edition ISBN10 8187433221.
- 3) Automotive Technology: Don Knowles: Cengage Learning
- 4) Automobile engineering Vol-I and Vok-II : Dr. Kripal Singh: Standard Publisher distributers

AUVOC303B Automotive Fuel and Emission Control System Corresponding Qualification Pack ASC/Q1404 Corresponding NOS: ASC/N 1407, ASC/N 1408, ASC/N 1409, ASC/N 1410

(4 Credits) (100 Marks)

Learning Objectives:

- i. To introduce Student with Automotive Fuels and Emission Control System
- ii. To Select appropriate type of fuel for engines
- iii. To make student recognize the significance of emission control system in automobiles

Course Outcomes:

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

COI Explain Emission Control System.					
CO2	Explain Precombustion Emission Control System.				
CO3	Explain Evaporative Emissions Control.				
CO4	Explain Post Combustion Emission Control System.				

UNIT I: Automotive Fuels

(9 Hours)

Air-fuel ratio, American Society for Testing and Materials (ASTM), Antiknock index (AKI), British thermal unit (BTU), Catalytic cracking, Cracking, Detonation, Distillation, Distillation curve, Driveability index (DI), E10, Ethanol, Fungible, Gasoline, Hydrocracking, Octane rating, Oxygenated fuels, Petroleum, Reformulated gasoline (RFG), Reid vapor pressure (RVP), Spark knock, Stoichiometric air fuel ratio, Tetraethyl lead (TEL), Vapor lock, Volatility, World Wide Fuel Charter (WWFC), Alternative Fuels.

UNIT II: Introduction to Air Quality and Emission Control System

(9 Hours)

Introduction, Air Quality Concerns, A brief History of Emissions Control, Combustion Process, How Rich Air/ Fuel Ratios affect Combustion, Vehicle Exhaust Emissions, Effects of Sulphur and other compounds on the Environment

UNIT III: Precombustion Emissions Control

(9 Hours)

Introduction, Changes in Engine Design, Spark Timing, Exhaust Gas Recirculation, Engine Operating conditions, Exhaust Gas Recirculation Strategies, Types of EGR Valves, Digital EGR Valves, Meeting NOx Emissions, Requirements without an EGR valve

UNIT IV: Evaporative Emissions Control

(9 Hours)

Introduction, Crankcase Evaporative Emissions, System Components, Orifice Type PCV systems, Separator PCV systems, Fuel System Evaporative Emissions, Purpose of Evaporative Emissions Control System, EVAP System Operation: Engine OFF, EVAP System Operation: Engine running

UNIT V: Post Combustion Emission Control

(9 Hours)

Introduction, Exhaust After Treatment, Catalyst Elements, Three-way Catalyst, TWC Design Improvements, Catalyst Operating Temperature, Light off Catalysts, Catalyst Heating Shields, Catalyst Poisoning, Repairing Catalytic Converters, Air Injection Reaction Systems, PCM Strategies

(15 Hours)

- Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill 10thedition ISBN: 9780070634350.
- Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill ISBN 10:0074602160.
- Basic Automobile Engineering: C P Nakara: Dhanpatrai publication ISBN-10:9352160983.
- Automotive Mechanics: S Shrinivasan: Tata McGraw Hill Second edition ISBN10 8187433221.
- Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributers ISBN- 10: 8180141969.

AUVOC304A Automobile Transmission System Corresponding Qualification Pack ASC/Q1404 Corresponding NOS: ASC/N 1407, ASC/N 1408, ASC/N 1409, ASC/N 1410 (4 Credits)

(100 Marks)

Learning Objectives:

To introduce Student with Automobile Transmission System along with key important concepts of Manual, Automatic and Four-wheel drive.

Course Outcomes:

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

CO1	Identify the components of transmission system.
CO2	Analyze the steering system.
CO3	Demonstrate the functional requirement of automobile transmission
CO4	Demonstrate the construction and working of Differential Mechanism
CO5	Explain working of Electronic Automatic Transmission

Contents:

UNIT I: Clutch Assemblies

(9 Hours)

Clutch Operation, Clutch Location, Clutch Design, Clutch Linkages, Mechanical Clutch Control, Hydraulic Clutch Controls, Clutch Pedal and Release Assemblies Pressure Plate, Clutch Disc, Flywheel

UNIT II: Manual Transmission and Transaxle

(9 Hours)

Introduction, Transmission Gears, Types of Manual Transmission, Synchronizers, Transmission Design, Basic operation of Manual Transmission, Power flow of Five Speed Transmission, Gear shift linkage Introduction to Manual Transaxle, Basic transaxle construction, Power flow through a transaxle, Differential action

UNIT III: Automatic Transmission and Trans Axle

(9 Hours)

Introduction, Torque Converter, Purpose and Design, Torque Convertor Application, Planetary Gearset, Design And Operation, Multiple Disc Clutch, Oil Pumps And Pressure, Governer, Throttle Linkages and Throttle Valves, Valve Body, Valve Body And Shift Valve, Accumulators, Modulators, Thrust Washers, Bushings and Seals.

UNIT IV: Electronic Automatic Transmission

(9 Hours)

Transmission Control Module, Hybrid Transmission, Basic EAT Testing, Converter Clutch Control Diagnostics, Detailed Testing of Actuators

UNIT V: Four- and All-Wheel Drive

(9 Hours)

Objectives, Types of Four-Wheel Drives, Four-Wheel-Drive Systems, Transfer Case, Interaxle Differentials, Locking Hubs, Four-Wheel-Drive Passenger Cars, All-Wheel Drive Systems, Diagnosing 4WD and AWD Systems, Servicing 4WD Vehicles.

UNIT VI: Tutorial/ Seminars/Project/Assignment/Case study

(15 Hours)

- Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill 10thedition ISBN: 9780070634350.
- Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill ISBN 10:0074602160.
- Basic Automobile Engineering: C P Nakara: Dhanpatrai publication ISBN-10:9352160983.
- Automotive Mechanics: S Shrinivasan: Tata McGraw Hill Second edition ISBN10 8187433221.
- Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributers ISBN- 10: 8180141969

AUVOC304B Automobile Body Repair Technology

Learning Objectives:

Demonstrate proper use of hand and power tools; demonstrate basic metalworking techniques; demonstrate basic fiberglass, SMC and plastic body filler repair; and demonstrate proper priming procedures.

Course Outcomes:

- 1. Explain construction details of a body component
- 2. Explain the different process is involved in coach work
- 3. Explain the maintenance procedure of vehicle body
- 4. Explain the different painting processes
- 5. Describe different refinishing process

Unit I: Body members of the automotive vehicle

(9 Hours)

Introduction – Car body construction details, major body sections of a passenger car-front section, centre section, rear section. Construction types – conventional body over frame, unitised frame and body construction. Fibre reinforced and metal reinforced body structures.

Unit II: Different types of coach work

(9 Hours)

Classification of coach work, coach and bus body styles, typical layout of bus and coach body, typical layout of commercial vehicles, vehicle body materials- steel, light alloys, plastics, textiles, glass, wood, aluminium materials, adhesives and their properties. Corrosion and their prevention.

Unit III: Different types of Body repair works and its tools

(9 Hours)

Hand tool study, power tool and equipment, workshop safety, minor repairs- repairing plastics, hood, bumper, fender, lid, and trim service, door, roof, glass service, passenger compartment service. Major body repair- frame repair, frame/body damage measurement, frame realignment procedure.

UNIT IV : Painting and Finishing

(9 Hours)

Paint materials, paint characteristics, refinishing process -paint removal, preparing bare metal, prime coat selection, final sanding, masking, surface cleaning. Spray guns, equipment and material preparation, spray gun setup, spray paint booth.

Unit V: Estimation of Body work repair.

(9 Hours)

The Estimate, Part Prices, Labor Costs, Refinishing Time, Estimate Total, Computer Estimating, Computer Database, Estimating Sequence, Vehicle Total Loss

UNIT VI: Tutorial/ Seminars/Project/Assignment/Case study

(15 Hours)

TEXT BOOK

James E Duffy - Body repair technology for 4-wheelers - Cengage Learning Delhi

REFERENCES

- 1. Janusz Pawlowski Vehicle body engineering Business Books
- 2. Paul Browne Auto care manual Bloomsbury Publishing Plc.
- 3. S F Page Body engineering Chapman and Hall, Limited, London, England
- 4. John Fenton vehicle body lay out Mechanical Engineering Publications
- 5. Andrew Livesey and A Robinson The Repair of vehicle bodies Routledge

AUVOC305 Laboratory Project-III

(Qualification Pack Code: ASC/Q 1404, Job Role Auto Service Technician Level 6)

(Corresponding Nos: ASC/N 1407, ASC/N 1409, ASC/N 0001, ASC/N 0002, ASC/N 0003)

NOS Description

ASC/N1407 Carryout advanced diagnosis of vehicle for engine and other mechanical repairs requirements.

ASC/N 1409 Carryout servicing, repairs and overhauling of vehicle (Advanced)

ASC/N 0001 Plan and organize work to meet expected outcomes

ASC/N 0002 Work effectively in team

ASC/N0003 Maintain a healthy, safe and secure working environment

Course Outcomes:

The course should enable students:

- To carry out the maintenance of suspension system.
- To perform the suspension system diagnosis and service.
- To perform the maintenance and diagnosis procedure of steering columns.
- · To perform the maintenance and diagnosis procedure of manual steering gear
- To carry out the manual steering gear service.
- Inspect tire condition; identify tire wear patterns; check and adjust air Pressure; determine necessary action
- Find the correct work methods and tools to use in changing wheels/tires and maintenance
- Identify and inspect brake system components; determine necessary action.
- Diagnose antilock brake system (ABS) electronic control(s) and components using self diagnosis and/or recommended test equipment; determine necessary action

Practical:

(At least 60% experiments have to be performed)

1. Suspension system Maintenance

Jobsheet:

- · Carryout the maintenance of shock absorber.
- · Carryout the maintenance of Front and Rear suspension system.
- Carryout the maintenance of Electronic air suspension system.
- Carryout Maintenance of Continuously Variable Road Sensing Suspension System (CVRSS)
- Carry Out Curb Riding Height Measurement.
- 2. Suspension system Diagnosis and Service

Jobsheet:

- Perform the diagnosis and service procedure of shock absorber.
- To Carryout diagnosis and service of Front and Rear suspension system.
- Perform the diagnosis of Electronic air suspension system.
- · To Carryout service procedure of Electronic air suspension system.
- To Carryout Diagnosis and Service of Continuously Variable Road Sensing Suspension System (CVRSS)

3. Steering columns and linkages Maintenance, Diagnosis and Service.

Jobsheet:

- · Perform the maintenance and diagnosis procedure of Steering Coloumn Design.
- Perform the maintenance and diagnosis procedure Parallelogram steering linkages.
- Perform the maintenance and diagnosis procedure Rack and Pinion Steering Linkages.
- Perform the maintenance and diagnosis procedure Steering Damper.
- · Perform the maintenance and diagnosis procedure of Steering columns.
- · Carryout the maintenance and diagnosis of steering linkages.
- · Perform the service procedure for steering linkage.

4. Manual and power steering gears Maintenance, Diagnosis and Service.

Jobsheet:

- · Perform the maintenance and diagnosis procedure of Manual steering gear.
- · Carryout the manual steering gear service.
- Carry out the power steering gears Maintenance and Diagnosis.

5 Wheel Alignment and Balancing

Jobsheet:

- Measure Front and Rear Wheel Alignment Angles with a Computer
- Wheel Aligner
- · Check Proper Steering Linkage Height by Measuring Toe Change
- · Center Steering Wheel
- Adjust Front Wheel Alignment Angles
- · Adjust Rear Wheel Alignment Angles
- Off-Car Wheel Balancing
- On-Car Wheel Balancing

6Tire, Wheel and Hub systems

Job sheet

- To Perform Tire Maintenance,
- To Perform Tire diagnosis,

- · To Perform Wheel and Tire Service,
- · To Perform Wheel and Rim Service
- · To Perform Tire and Wheel Balancing,
- To Perform Wheel Bearing Maintenance,
- · To Perform Wheel Bearing Diagnosis
- · To Perform Wheel Hub Unit Diagnosis.
- To Perform Rear axle Bearing and Seal Service.

7 Conventional Brake System

Jobsheet

- To Perform Assembly and Dismantle procedure
- To Perform Brake System Maintenance.
- To Perform Brake System diagnosis
- To Perform Brake Service
- To Perform Vacuum boaster testing
- To Perform Road test procedure
- To Perform Bleeding procedure

8 Antilock Brake system,

Jobsheet

- To Perform Antilock Brake system maintenance
- To Perform ABS Diagnosis, OBD I Vehicles
- To Perform ABS Diagnosis, OBD II Vehicles.
- To Perform Wheel Speed Sensor Diagnosis
- To Perform ABS service

9 Frames and Frame Damage

Jobsheet

- · Frame Measurement, Plumb Bob Method
- Inspect and Measure Front Cradle
- Inspect and Weld Vehicle Frame
- Unibody Frame Realignment
- Preparing Panel for welding

10. Automobile Transmission System

Jobsheet

- · Perform Trouble Shooting Of Clutch Assembly
- · Perform Inspection and Service of Clutch Linkages
- · Perform Service of Hydraulic Clutch
- · Perform inspection and service of clutch
- · Remove and Install a Transmission Unit
- Disassemble and Reassemble a Typical Transaxle

- Perform Servicing Of Gears and Synchronizer
- Perform Road Testing On Vehicle to Identify Transmission Problem
- Perform Inspection and Adjustment of Shift Linkages
- · Perform Replacement of Transmission Oil
- Perform Diagnosis of Transmission Noise Problem
- Perform Service of Companion Flange and Pinion Seal Service
- · Perform Measurement and Adjustment of Pinion Depth Bearing Preload and Backlash
- Perform Servicing of Ring and Pinion Gear
- Perform Servicing Of Center Support Bearing
- Perform Differential Case Service
- Perform Testing of Transmission Sensors and Switches
- Describe Operation of Electronic Controlled Transmission

AUVOC306 Major Project-III/Industrial Project-III

The Major Project-III/Industrial Project-III is one of the primary the mechanisms used by the College to provide the students with an opportunity to gain experience in the practical, effective, efficient, and beneficial application of what you have been studying for the past several years.

Course Outcomes:

- · Critical thinking in problem solving
- · Presentation and communication skills
- · Report organization and writing skills
- · Independent learning and information integration skills
- · Project management skill
- Work as an individual, with support from a supervisor, formulating solutions to dayto-day problems by integrating knowledge and experience gained on the course and outside the course.

Activity

Students are expected to go through review of literature on a particular technical aspect and/or pay industrial visit to identify a point of further study and investigation. The student (or group of students), thereafter, would propose a subject on basis of literature review and/or industrial orientations and will have to present a short seminar on his/her proposal to the board of examiners constituted by faculties of the department. If approved, he/she will be allowed to work on that particular project. Within a week after this approval, the student(s) will have to finalize their topic/subject of project and duly officiate it.

During phase - I of Industrial Project, it is expected that the student(s) will-

- i. Build up a concrete fundamental of the concept on which they are going to work
- ii. Carry out thorough literature survey to find out scope of work in the particular field
- iii. Thereby, finalizing the topic of further study/investigation and finally, draft a systematic experimental plan to achieve projected goal
- iv. Deliver regular presentations
- Systematically document the above activities in bound volume and submit one copy to the department, one copy to concerned faculty and retain one copy with him/her.

B.VOC Automobile

Semester II Pattern 2020

Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

Professor Mahendra D. Shirsat Director, Deen Dayal Upadhyay Kaushal Kendra. Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (MS) -431 004

	ğ	SEMEST	ER – II					
	Genera	l Academ	ic Com	ponent				
THE TAX		Contact Hours Per Week			Evaluation Scheme		Total Marks	Credit
Sr. No.	Name of the Course	L	T	P	CIA	SEE		
AUVOC201	Industrial Safety Practices	3	1	0	20	80	100	4
AUVOC202	Engine Electrical Systems	3	1	0	20	80	100	4
AUVOC203	Fuel Injection and Ignition System	3	1	0	20	80	100	4
Skill Developm	ent Component	-						
AUVOC204	Engine Control Systems	3	1	0	20	80	100	4
AUVOC205	Lab Course-II	-	*	8		100	100	4
AUVOC206	Laboratory Project-II	-	The second	*	-	200	200	10
TOTAL			-		-1	-	700	30

Professor Mahendra D. Shinsar Director, Deen Dayal Upadiyay Kaushai Kendra, Dr. Babasaneb Ambeditar Marathwada University, Aurangabad (MS) 431 004 Dean
Feedility of Science & Technology
Disconsisted in electrology
Disconsisted in electrology

AUVOC201: Industry Safety Practices

(4 Credits: 100 Marks)

Learning Objectives

- 1. To introduce students with basic postulates of safe work environment and practices
- To provide basic ideas on fatigue, accidents, hazards and personal protection to students.
- 3. To provide students with essential knowledge of safe working practice
- 4. To introduce students with legal aspects and safety regulations at workplace

Course Outcomes

On completion of the course, students should be able to -

- 1. Discuss basic postulates of safe work environment and practices
- 2. Recognize threats of fatigue, accidents, hazards and Personal Protection
- 3. Adapt safe working practices
- 4. Correlate legal aspects of safety and necessary preventive measures in workplace

Course Contents:

Unit 1: Basics of Industrial Safety

(10hrs)

Safety Responsibility and Organization, Occupational Health and Safety Program, Safety Policy, Safety inspection, Safety Planning, Safety Measures in Manufacturing Industry, Employee's participation in safety, Supervisory Responsibility in Safety, Relationship of safety with plant design, equipment design and work environment, Regulatory Agencies and Statutory Bodies; Main Provisions of Factory Act 1948; Safety Symbols – Safety Signs and Colours, Categories, Posting Signs, Training and Maintenance

Unit 2: Industrial Accidents and Hazards

(08hrs)

Introduction, Classification of Accidents in Industry, Causes and Prevention of Accidents, Accident Reporting; Classification of Hazards, Hazard Management Program, Major Industrial Hazards, Machine Guarding, Industries involving hazardous processes, Machine Guarding; Handling Emergencies- Workplace emergency, Emergency Planning concepts, Emergency Action plan, Onsite and Offsite planning, Fire Emergency procedure

Unit 3: Environmental factors in Industry - I

(09hrs

Environment, Need of Environmental Control, Environmental Factors in Industry, Effect of environmental factors on Human body and mind; Lighting- Importance of adequate lighting, terminologies, Recommended Illumination Values of Industrial Buildings and Processes, Principles of Good Illumination, Colour Codes used in industries; Heat Control- Heat Stress, Heat Stress Disorders, Preventing Heat Stress, Heat Stress Indices, Thermal Comfort, Conditions for Thermal Comfort

Unit 4: Environmental factors in Industry - II

(09hrs)

Ventilation and Air Conditioning, Legal Requirements, Health Effects of Improper ventilation, Methods of ventilation, Air conditioning system selection; Noise and its types, Hazardous Noise, Legal requirements, Sound levels, Noise Control; Health effects of vibration, Effective Management of Vibration; Industrial Fatigue, Types of Fatigue, Effects of Fatigue, Fatigue Indicators, Management and Mitigation of Fatigue, Sleep Cycle

Unit 5: Preventive Machineries

(09hrs)

Personal Protective Equipment (PPE)- Need, Legal Requirements, Types of PPE, Suitable PPE, Training in use of PPE, Maintenance of PPE; Occupational Health Problems-Occupational Diseases, Medical Examinations in Industry, Medical Records, First Aid

Unit 6: Tutorial (15 Hrs

Assignments; Seminars; Exercises based on Unit 1 to 5

Reference:

Text:

 Industrial Safety and Environment – A. K. Gupta; University Science Press; ISBN 978-8131804544

Suggested Reading:

- Grimaldi and Simonds, Safety management: ATTBS publishers, New Delhi 2001; ISBN-81-85386-06-4
- Industrial safety and pollution control handbook; National Safety Council and Associate publishers pvt. ltd; Hyderabad;

Web:

1. https://nptel.ac.in/courses/110/105/110105094/

AUVOC 202: Engine Electrical Systems

(4 credit, 100 marks.)

(Corresponding NOS: ASC/N 1406)

Learning Objectives:

- Knowledge in vehicle electrical and electronics components for engine operation.
- · Repair engine electrical system components.
- Install, check, and service engine electrical wiring, controls, switches, indicators, and protective devices.

Course outcomes

After completion of this course students should be able to

- 1) Explain battery operation, battery design and cell groups.
- 2) Describe the operation of starting motor and starter solenoid.
- 3) Describe ignition system operation.
- 4) Describe fouled spark plug condition.
- 5) Diagnose charging system problems.

UNIT -1: Batteries

(9 Hours)

Introduction, Battery Construction, How a Battery works, Specific Gravity, Valve regulated lead – Acid Batteries, Causes and Types of Battery Failure, Battery Ratings, Battery Sizes

UNIT -2: Cranking Systems

(9 Hours)

Cranking Circuits, Computer Controlled Starting, Starter Motor Operation, Working of Starter Motor, Gear Reduction Starters, Starter Drives, Positive Engagement Starters, Solenoid – Operated Starters

UNIT -3: Charging systems

(9 Hours)

Principles of Alternator Operation, Alternator Construction, Alternator Overrunning pulleys, Alternator Components and Operation, Working of Alternator, Alternator Output Factors, Alternator Voltage Regulation, Alternator cooling, Computer controlled Alternators

UNIT-4: Ignition Circuit

(9 Hours)

Introduction, Spark Plugs, Distributor Ignition (DI) Systems, Distributor Advances, Computer-Controlled Spark Advance, Electronic Ignition (EI) Systems, Coil-On-Plug and Coil-Near-Plug, Ignition Systems

UNIT-5: On Board Diagnosis

(9 Hours)

On- Board Diagnostic Generation II Systems, Diagnostic Executive and Task Manager, Monitors, OBD – II Monitor Information, Enabling Criteria, OBD II DTC Numbering Designations, OBD II – Freeze Frame, PCM Tests, Diagnosing Problems using Six modes

UNIT-VI Tutorials, case studies and presentation based on Module I to V (15 Hours)

- 1. Automobile Technology, Volume II by Kripal Singh, 2009
- 2. Automobile engineering, Dr. R.K.Singhal ISBN:9788185749488 Reprint 2015

- 3. Automobile engineering, Dr. R.K.Rajput ISBN:81700089913 Reprint 2015
- 4. Modern transmission A.W.Judge Chapmen and Hall std

AUVOC 203 Fuel Injection and Ignition System Corresponding Qualification Pack ASC/Q1404 Corresponding NOS: ASC/N 1407, ASC/N 1408, ASC/N 1409, ASC/N 1410

(4 Credits) (100 Marks)

Learning Objectives :

- To present a problem oriented in depth knowledge of Injection and Ignition system.
- To address the underlying concepts, methods and application of Fuel Injection and Ignition system.

Course Outcomes:

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

COI	Explain Fuel system S.I. engine.	
CO2	Explain Fuel system C.I. engine.	
CO3	Explain Air Induction and Exhaust System.	
CO4	Explain Throttle Body and Port Fuel Injection System.	

Contents:

UNIT I: Introduction to fuel system

(9 Hours)

Introduction, Gasoline, Volatility, Detonation and Pre-ignition, Octane Rating, Fuel Delivery, Primary Fuel Delivery, Fuel Tank, Fuel Sender, Fuel Pump, Mechanical Fuel pump, Fuel pump circuits, Fuel Filters, Fuel Lines

UNIT II: Air Induction and Exhaust System

(9 Hours)

Introduction, Volumetric Efficiency Backpressure, Air Induction System, Exhaust System, Forced Induction, Supercharger, Turbocharger, Throttle Body, Fuel Injector, Intake Manifold, Idle Air Control, Basic Fuel Control, Special Modes, Returnless fuel system, Intake manifolds, Port Fuel Injection System, Basic Fuel Control, Special Modes.

UNIT III: Ignition System

(9 Hours)

Basic Circuitry, Ignition Components, Spark Plugs, Triggering and Switching Devices, Engine Position Sensors, Distributor Ignition System Operation, Electronic Ignition Systems, EI System Operation

UNIT IV: Ignition System Diagnosis

(9 Hours)

Objectives, Misfires, General Ignition System Diagnosis, Visual Inspection of Ignition Systems, No-Start Diagnosis, Diagnosing with an Engine Analyzer, Diagnosing with a DSO, or GMM 852, Ignition Timing 854, Basic Primary Circuit Components, Distributor Service, Secondary Circuit Tests and Service

UNIT V: Fuel system Diagnosis and Service

(9 Hours)

Objectives, Preliminary Checks, Basic EFI System Checks, Injector Service, Fuel Rail, Injector, and Regulator Service, Electronic Throttle Controls, Idle Speed Checks, Basic Fuel System Diagnosis, Guidelines for Safely Working on Fuel Systems, Fuel Tanks, Filler Caps, Fuel Lines and Fittings, Fuel Filters, Fuel Pumps

UNIT VI: Tutorial/ Seminars/Project/Assignment/Case study

(15 Hours)

References:

- Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill 10thedition ISBN: 9780070634350.
- Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill ISBN 10:0074602160.
- Basic Automobile Engineering: C P Nakara: Dhanpatrai publication ISBN-10:9352160983.
- Automotive Mechanics: S Shrinivasan: Tata McGraw Hill Second edition ISBN10 8187433221.
- Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributers ISBN- 10: 8180141969.

AUVOC 204 ENGINE CONTROL SYSTEMS

(4 Credits, 100 marks)

(Qualification Pack Code: ASC/Q 1404, Job Role Auto Service Technician Level 6)

NOS	Description
ASC/Q 1404	Automotive Service Technician Level 6

Learning Outcomes:

- i. Diagnose and maintain the engine control system.
- ii. Carry out On board diagnostics.
- iii. Introduce students with engine control system.

Course Outcomes

After completion of this course students should be able to

- 1) Explain engine control system and its components.
- 2) Describe the working of sensors and module in engine control systems.
- 3) Describe injection system operations.
- 4) Carry out On board diagnostics.
- 5) Diagnose and maintain the engine control system.

Contents:

UNIT I: Basic Engine Control System

(09 Hours)

Introduction, Analog voltage signals, Digital voltage signals, Coding, Binary codes, Signal Conditioning, Microprocessors, Memory chips, Drivers, Electric Circuits, Fuel Pump Electric Circuit, Regulators, Fuel Pump filter and pressure regulators.

UNIT II: Modules and Sensors for Engine control system

(09 Hours)

Introduction, Modules, Control Modules, Powertrain control module, Sensors, Location, Input sensors, Oxygen sensors, Pressure sensors, Temperature sensors, Flow sensors, Positioning sensors, Knock sensors.

UNIT III: Injection systems

(09 Hours)

Introduction, Injection systems, Classification, Mechanical injection systems, Electronic injection systems, Throttle body injection system, Multiport Fuel Injection system, Sequential fuel injection system, Central port fuel injection system.

UNIT IV: Diagnostic systems

(09 Hours)

Introduction, Definitions, Requirements, On-Board Diagnostics systems, On-Board Diagnostics system – I (OBD – I),On-Board Diagnostics system – II (OBD – II), Malfunction lights, Coding system, Fault Codes, Trouble codes, Failure records, Monitoring, Limits for OBD's, Future of On-Board Diagnostics system

UNIT V: Engine Management

(09 Hours)

Combined ignition and fuel management, Exhaust emission control, Control of diesel emissions, complete vehicle control systems, Case study – Maruti Swift, Diagnosing engine management system faults, advanced engine management technology, new developments in engine management.

UNIT VI: Tutorial/ Seminars/Project/Assignment/Case study

(15 Hours)

References:

- 1) Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill 10thedition ISBN: 9780070634350.
- 2) Automotive Mechanics: S Shriniyasan: Tata McGraw Hill Second edition ISBN10 8187433221.
- 3) Automotive Technology: Don Knowles: Cengage Learning
- 4) Automobile engineering Vol-I and Vok-II : Dr. Kripal Singh: Standard Publisher distributers

AUVOC205 Laboratory Course II

(Corresponding NOS: ASC/N 1406, ASC/N 0001, ASC/N 0002, ASC/N 0003)

Course outcomes

After completion of this course students should be able to

- 1) Perform basic battery maintenance and tests
- 2) Perform maintenance, diagnosis and service of battery charging system.
- 3) Diagnose and test starting motor
- 4) Inspect alternator belt and adjust belt tension.
- 5) Do ignition system maintenance diagnosis and service.

Practical's :-

(At least 60% experiments have to be performed)

1) Battery and Starting System

Jobsheet:-

- 1. To do Battery Maintenance
- 2. To do Battery Diagnosis and Service
- 3. To do Starting Motor Maintenance
- 4. To do Starting Motor Diagnosis
- 5. To carry out Solenoid Diagnosis and Testing
- 6. To perform Starting Motor Service and Inspection

2) Charging System Maintenance, Diagnosis, and Service

Jobsheet:-

- 1. To do Alternator and Voltage Regulator Maintenance
- 2. To carry out Charging System Diagnosis
- 3. To Scan Tool Diagnosis of Charging Systems
- 4. To do Charging Circuit Voltage Drop Testing
- 5. To do Alternator Service and Inspection

3) Ignition System Maintenance, Diagnosis, and Service

Jobsheet :-

- 1. To do Spark Plug Maintenance
- 2. To perform Spark Plug Diagnosis, and Service
- 3. To do DI System Maintenance
- 4. To do DI System Diagnosis, and Service
- 5. To perform Checking and Adjusting Ignition Timing
- 6. To do El Maintenance, Diagnosis, and Service
- 7. To do Coil-On-Plug and Coil-Near-Plug Ignition System Maintenance, Diagnosis, and Service.

4) Fuel Injection and Ignition System

Jobsheet :-

- 1. Perform Fuel System Diagnosis
- 2. Perform Fuel Pressure Testing

- 3. Perform Fuel Pump Volume Test
- 4. Perform Fuel Filter Testing
- 5. Perform Fuel Pump Circuit Diagnosis
- 6. Perform Pressure Leakdown Test
- 7. Identify Leaking Injectors
- 8. Perform Fuel Pressure Regulator Diagnosis
- 9. Perform Injector Testing
- 10. Perform Fuel Injector Cleaning
- 11. Perform Fuel Quality Diagnosis
- 12. Perform Throttle Body Service
- 13. Perform Idle Air Control System Diagnosis
- 14. Perform Exhaust System Inspection
- 15. Perform Backpressure Testing
- 16. Perform Test on Forced Induction System
- 17. Perform Drive ability Symptoms

5) . Input sensor

Jobsheet:

- 1. To do Input Sensor maintenance
- 2. To do Input Sensor diagnosis
- 3. To do Input Sensor service
- 4. To do Oxygen Sensor maintenance
- 5. To do Oxygen Sensor diagnosis
- 6. To do Oxygen Sensor service

6) . Fuel Pump

Jobsheet:

- 1. To perform Fuel Pump Pressure test
- 2. To do Fuel Pump Pressure diagnosis
- 3. To perform Fuel Pump Pressure maintenance
- 4. To do Engine Coolant Temperature diagnosis
- 5. To do Intake air temperature sensor diagnosis
- 6. To do Manifold Absolute Pressure Sensor diagnosis

7) Sensors

Jobsheet:

- 1. To do Throttle Position Sensor diagnosis
- 2. To perform Throttle Position Sensor service
- 3. To do Mass Air Flow Sensor diagnosis
- 4. To do Mass Air Flow Sensor service
- 5. To do Knock Sensor diagnosis
- 6. To do Knock Sensor maintenance

8) Engine Control System

Jobsheet:

- 1. To do engine control system scan
- To do engine control system tool diagnosis
- 3. To carry out diagnosis for Diagnostic Trouble Codes
- 4. To perform On-Board Diagnostic (OBD) on a vehicle
- 5. To resolve the On-Board Diagnostic (OBD) trouble codes

VOC 206 Laboratory Project-I

(10 Credits 200 Marks)

The semester end project is one of the primary the mechanisms used by the College to provide the students with an opportunity to gain experience in the practical, effective, efficient, and beneficial application of what you have been studying for the past several years.

Course Outcomes:

- · Critical thinking in problem solving
- · Presentation and communication skills
- · Report organization and writing skills
- · Independent learning and information integration skills
- · Project management skill
- Work as an individual, with support from a supervisor, formulating solutions to dayto-day problems by integrating knowledge and experience gained on the course and outside the course.

Activity

Students are expected to go through review of literature on a particular technical aspect and/or pay industrial visit to identify a point of further study and investigation. The student (or group of students), thereafter, would propose a subject on basis of literature review and/or industrial orientations and will have to present a short seminar on his/her proposal to the board of examiners constituted by faculties of the department. If approved, he/she will be allowed to work on that 'particular project. Within a week after this approval, the student(s) will have to finalize their topic/subject of project and duly officiate it.

During phase - I of Industrial Project, it is expected that the student(s) will-

- i. Build up a concrete fundamental of the concept on which they are going to work
- ii. Carry out thorough literature survey to find out scope of work in the particular field
- iii. Thereby, finalizing the topic of further study/investigation and finally, draft a systematic experimental plan to achieve projected goal
- iv. Deliver regular presentations
- v. Systematically document the above activities in bound volume and submit one copy to the department, one copy to concerned faculty and retain one copy with him/her.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO./SYLLABUS./FACULTY OF SCIENCE TECH./B.Voc./37/2021.

It is hereby inform to all concerned and that, on the recommendation of Ad-hoc Board in Vocational Studies & subsequently, Dean, Faculty of Science & Technology the Hon'ble Vice Chancellor has accepted the following Curriculum of B.Voc. & M.Voc. Courses of Choice Based Credit and Grading System under the faculty of Science & Technology in his emergency powers under section 12(7) of the maharashtra public univerities act, 2016 on behalf of the academic council as appended herewith.

Sr.No.	Name of the B.Voc & M.Voc Syllabus	Semester	
1.	B.Voc. Industrial Automation	Semester-VI-Pattern-2018	
2.	B.Voc. Industrial Automation	Semester-VI- Uniform Pattern-2019	
3.	B.Voc. Industrial Automation	Semester-V- Uniform Pattern-2019	
4.	B.Voc. Industrial Automation	Semester-IV- Uniform Pattern-2019	
5.	B.Voc. Industrial Automation	Semester-VI-Pattern-2020	
6.	B.Voc. Industrial Automation	Semester-V- Pattern-2020	
7.	B.Voc. Industrial Automation	Semester-IV-III and II - Pattern-2020	
8.	M.Voc. Industrial Automation	Semester-IV-III and II - Pattern-2020	
9.	B.Voc. Automobile	Semester-VI-Pattern-2018	
10.	B.Voc. Automobile	Semester-VI- Uniform Pattern-2019	
11.	B.Voc. Automobile	Semester-V- Uniform Pattern-2019	
12.	B.Voc. Automobile	Semester-IV- Uniform Pattern-2019	
13.	B.Voc. Automobile	Semester-VI- Pattern-2020	
-14.	B.Voc. Automobile	Semester-V- Pattern-2020	
15.	B.Voc. Automobile	Semester-IV,III and II Pattern-2020	
16.	M.Voc. Automobile Technology	Semester-IV, III and II Pattern-2020	

This is effective from the <u>Academic Year 2021-2022</u> and onwards.

This B.Voc. & M.Voc. Curriculum with Structure is also available on the University website www.bamu.ac.in

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University campus, & Aurangabad-431 004. Ref. No. SU/B.Voc.Syll./2021/3/724-301

Date: 31.05.2021

Deputy Registrar, Academic [Syllabus] Section.

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Copy forwarded with compliments to :-

- The Director, Deen Dayal Upadhyay KAUSHAL Kendra,
 Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- The Principals, affiliated concerned Colleges,
 Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
- 3] The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.
 Copy to:-
- 1] The Director, Board of Examinations & Evaluation,
 - 2] The Section Officer, [M.Voc & B.Voc. Unit] Examination Branch,
 - 3] The Section Officer, [Eligibility Unit],
 - 4] The Programmer [Computer Unit-1] Examinations,
 - 5] The Programmer [Computer Unit-2] Examinations,
 - 6] The In-charge, [E-Suvidha Kendra],
 - 7] The Public Relation Officer,
 - 8] The Record Keeper,

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

JK29052021*/-

PARATHWADA UNIVERSITA P



Syllabus Of B.Voc. Automobile

SEMESTER -V & VI

(Pattern-2020)

[Effective from 2021 & 2022 & onwards]

B.VOC Automobile

Semester V & VI Pattern 2020

Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

Professor Mahandra D. Shirsat Director, Deen Dayal Upadhyay Kaushal Kendra, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (MS) -431 004

Course Structure and Syllabus Sem V (Pattern2020) Bachelor of Vocation (B. Voc) in Automobile

In Plant Training - I

Students should complete their In Plant Training (off campus) in relevant industry for the period of 10-12 weeks and submit a detailed report of the same to the department. The student should also collect evaluation sheet (in sealed envelope) from the industry coordinator and submit it to the department/college. Internal evaluation of the candidate during the In-Plant Training will be evaluated by the concerned Industry and the Semester End Evaluation will be performed by Department/ University.

Course Structure and Syllabus Sem V (Pattern2020) Bachelor of Vocation (B. Voc) in Automobile In Plant Training – II

Students should complete their In Plant Training (off campus) in relevant industry for the period of 10-12 weeks and submit a detailed report of the same to the department. The student should also collect evaluation sheet (in sealed envelope) from the industry coordinator and submit it to the department/college. Internal evaluation of the candidate during the In-Plant Training will be evaluated by the concerned Industry and the Semester End Evaluation will be performed by Department/ University.

Autengabad (MS)