

GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021) Semester –IV

Course Title: Automobile professional practice-1 (Course Code: 4340205)

Diploma programme in which this course is offered	Semester in which offered
Automobile Engineering	4 th semester

1. RATIONALE

The vehicle business is growing incredibly swiftly in India. Whether it be in the production, sales, or service sectors, the automobile industry is in dire need of qualified labour. Successful and effective management of any industry or service station requires an understanding of basic management ideas and procedures. Regular maintenance is necessary for vehicles to preserve their drivability, dependability, comfort, and safety as well as to increase their useful lives. In India, two- and three-wheeled vehicles account for a large market share. This sector has a substantial employment potential, thus a lot of managerial, technical, and support staff are needed. Teaching students about the management and maintenance procedures used on four-, three-, and two-wheeled vehicles is essential to help it. This course aims to satisfy that need.

2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop different types of skills leading to the achievement of the following competency.

- **Perform professional duties in automotive workshop/garage effectively.**

3. COURSE OUTCOMES (COs)

The underpinning knowledge and the relevant skills associated with this competency are to be developed in the student to display the following COs:

- a) Carryout vehicle inspection and maintenance work with safety.
- b) Maintain the workshop documentation and records.
- c) Perform maintenance procedure of the two and three-wheeler automotive system.
- d) Describe industrial revolution and industrial internet of things.
- e) Develop individual professional skills.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
0	0	6	3	-	-	50**	50	100

(*):For this practical only course, 50 marks under the practical CA has two components i.e. the assessment of micro-project, which will be done out of 20 marks and the remaining 30 marks are for the assessment of practical. This is designed to facilitate attainment of COs holistically, as there is no theory ESE.

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit, CA - Continuous Assessment; ESE - End Semester Examination.

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) that are the sub-components of the COs. These PrOs need to be attained to achieve the COs.

Sr. No	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Execute planned maintenance schedule with the help of proper tools and equipment which include <ul style="list-style-type: none"> - Assess damage to vehicle and identify repair and replacement need. - Understand which types of maintenance/servicing is required for a given vehicle. - Detail planning of maintenance/ servicing which must include list of tools/equipment, list of consumables and list of parts to be replaced or repaired. - Execute the planned schedule with safety. 	1	10
2	Perform inspection of brake down vehicle and list out repair/ replacement work required for total repair.	1	04
	OR		
2	Perform visual inspection of given working engine and write notes on findings.		04
3	Visit store of any big vehicle workshop and list out practices followed for store keeping in detail.	2	04
4	Prepare a document for vehicle service record maintained in the automotive workshop. (Document should cover date, servicing details with repaired/replaced parts and costing etc.)		04
5	Draw layout of authorized automobile workshop considering important points to be taken care of, rules and safety aspects.		04
6	Prepare document for purchasing any item in automotive workshop.		04
7	Identify the major components and assemblies of two-wheeler and three-wheeler vehicle.	3	04
8	Perform adjusting/ changing procedure of a cable wire used to control various system in a vehicle.		04
9	Perform cleaning and adjusting procedure of spark plug gap.		04
10	Perform chassis lubrication procedure on the given vehicle.		04
11	Perform service and adjustment procedure of the braking system on the given vehicle.		04
12	Remove and replace primary and secondary Air filters.		04
13	Maintain wiring harness of given vehicle.		04

14	Plan and arrange visit of vehicle manufacturing plant/ automotive workshop/ Auto parts manufacturing unit/ Repowering unit /car modification workshop. Following points must be covered in report of visit 1. Organization structure (if plant is too big then structure of visited department only) 2. List of machine tools, instruments, tools etc. used in visited place. 3. Detailed procedure of work carried out at visited place 4. Safety precautions followed.	5 and 4	08
15	Group discussion on topics covered in this course or any other branch specific.		04
16	Expert talk on topics covered in this course or any other branch specific.		04
17	Presentation and Report writing on topics covered in the unit IV of this course.		10
Total Hrs.			84

Note

- i. More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. **The above table is only a suggestive list.**
- ii. Care must be taken in assigning and assessing study report as it is a study report. Study report, data collection and analysis report must be assigned in a group. Teacher has to discuss about type of data (which and why) before group start their market survey.
- iii. The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency.

S. No.	Sample Performance Indicators for the PrOs (Practical 01 to 06 AND 14 to 17)	Weightage in %
1	Understanding of practical objectives	20
2	Execute proper work plan as per given schedule/Participation in assigned activity.	40
3	Prepare documentation for given work.	20
4	Timely submission	20
Total		100

S. No.	Sample Performance Indicators for the PrOs (Practical 07 to 13)	Weightage in %
1	Identification of various parts/components (Practical 3)	20
2	Explain its main function.	40
3	Perform service /repair procedure for given vehicle.	20
4	Work perform as per given schedule.	20
Total		100

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practical in all institutions across the state.

Sr. No.	Equipment/Chart/ Layouts Name with Broad Specifications	PrO. No.
1	Double ended spanner set 6-32mm Ring spanner set 6-32mm Tubular spanners 8,10,12,14,16,17mm Socket spanners 6-32 mm with T bar and ratchet Allen keys 4-12mm in steps of 2mm Screw driver (flat) 20cm x 9mm blade Screw driver (flat) 30cm x 9 mm blade Screw driver (Philips type) 100 -300mm set of 5 pieces Hammer ballpeen 0.75 kg Mallet hammer, Rubber hammer Nose plier straight 15 cm Combination plier 15 cm Circlip plier external & contracting 6” Circlip plier external & contracting 7” Feeler gauge 20 blades metric Adjustable spanner 20 cm Spark plug spanner 12,14,17mm File different shapes and size of 15cm Pneumatic Gun Battery gun Socket set Screw Bit set Torque wrench 0-50 NM Digital Multi meter Tappet adjuster Air compressor 200 liters capacity Impact screw driver for flat and Philips type	1,2 and 7 to 13
2	Record keeping method and necessary form for workshop documentation.	3 to 6
3	Any vehicle for maintenance and service/repair.	7 to 13
4	Informative charts for the Automobile Industry Revolution 4.0.	14

7. AFFECTIVE DOMAIN OUTCOMES

The following *sample* Affective Domain Outcomes (ADOs) are embedded in many of the above mentioned COs. More could be added to fulfil the development of this course competency.

- a) Work as a leader/a team member.
- b) Follow ethical practices.
- c) **Practice environmental friendly methods and processes. (Environment related)**

The ADOs are best developed through the field based exercises/project work. Moreover, the level of achievement of the ADOs according to Krathwohl’s ‘Affective Domain Taxonomy’ should gradually increase as planned below:

- i. ‘Valuing Level’ in 1st year
- ii. ‘Organization Level’ in 2nd year.
- iii. ‘Characterization Level’ in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit I Vehicle Maintenance practices	1.a Explain different types of vehicle maintenance. 1.b Describe vehicle maintenance checkup and procedure.	1.1 Introduction of vehicle maintenance practice. 1.2 Types of vehicle maintenance: - Daily maintenance - Weekly maintenance - Preventive maintenance - Breakdown maintenance 1.3 Maintenance checkup procedure. 1.4 Vehicle service procedure
Unit II Workshop Management Practices	2.a Explain importance of proper hierarchic and workshop layout in automobile workshop. 2.b Explain different types of Management in the automobile industry. 2.c Described duties in workshop management 2.d Understand importance and details of different types of workshop documents and record.	2.1 Organization structure of the automobile workshop. 2.2 Layout of workshop. 2.3 Requirement and importance of the workshop management. 2.4 List of activities and duties of the workshop management. 2.5 Procedure and function of material management. 2.6 Inventory Control 2.7 Maintain procedure and steps of the workshop documentation and records. (Quotations, Tenders, Store records, Bin card, Store Ledger, warranty vehicle registration) 2.8 Importance and requirement of purchase, store keeping, customer care and vehicle sales and promotion departments.

Unit III Two and Three wheeler Technology	<p>3.a Explain construction and functional details of two-wheeler and three-wheeler components.</p> <p>3.b Describe maintenance and service/repair procedure of two-wheeler and three-wheeler.</p> <p>3.c Perform adjusting/changing any control cable in two-wheeler and three-wheeler.</p>	<p>3.1 Major components of two-wheeler and three-wheeler.</p> <p>3.2 Maintenance and service/repair of two-wheeler and three-wheeler.</p> <p>3.3 Adjust/change wire cable/control cable of two-wheeler and three-wheeler.</p>
Unit IV Industrial Revolution and Industrial Internet of Things	<p>4.a Describe Industrial revolution 4.0</p> <p>4.b Explain different application of Industrial Internet of things.</p>	<p>4.1 Introduction- Industrial Revolution.</p> <p>4.2 Core idea of industry 4.0</p> <p>4.3 Conceptual frame work and road map of Industry 4.0</p> <p>4.4 Understanding of Industrial Internet of Things.</p> <p>4.5 Artificial Intelligence.</p> <p>4.6 Application of Industrial Internet of Things.</p>
Unit V Group Discussion/Industrial visit/Expert talk/ Presentation	<p>5.a Participate in given activity and develop observing and listing, analyzing and applying, speaking and listening skill as well as time management skill to finish assigned task (activities are group discussion/ industrial visit/ expert talk /presentation.)</p>	<p>5.1 Industrial visit (Suggestive points for best outcome)</p> <ul style="list-style-type: none"> • Preparation of task sheet before visit. • Noting of important points during visit • Participation during visit • Report writing covering task sheet data, noted information in detail. <p>5.2 Group discussion (Suggestive points for best outcome)</p> <ul style="list-style-type: none"> • Give topic for group discussion in advance • Discuss tips for getting good score in group discussion. <p>5.3 Expert talk (Suggestive points for best outcome)</p> <ul style="list-style-type: none"> • Aware students well in advance about main theme of expert talk. <p>5.4 Presentation</p>

Note: The UOs need to be formulated at the 'Application Level' and above of Revised Bloom's Taxonomy' to accelerate the attainment of the COs and the competency.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Vehicle Maintenance practices					
II	Workshop Management Practices					
III	Two and Three wheeler Technology					
IV	Industrial evolution and Industrial Internet of Things					
V	Group Discussion/Industrial visit/Expert talk/Presentation					
	Total					

Legends: R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)

Note: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions to assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may slightly vary from above table.

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of each activity. They should also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

- Charts can be prepared.
- Small report on any topic given by concern faculty.
- Small groups of students can be formed for assigned work. Assigned work should be such that it covers market survey, team work, presentation, time management, quality development.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

- Massive open online courses (**MOOCs**) may be used to teach various topics/sub topics.
- Guide student(s) in undertaking micro-projects.

- c) **'L' in section No. 4** means different types of teaching methods that are to be employed by teachers to develop the outcomes.
- d) About **20% of the topics/sub-topics** which are relatively simpler or descriptive in nature is to be given to the students for **self-learning**, but to be assessed using different assessment methods.
- e) With respect to **section No.10**, teachers need to ensure to create opportunities and provisions for **co-curricular activities**.
- f) **Guide students on how to address issues on environment and sustainability**

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably being **individually** undertaken to build up the skill and confidence in every student to become problem solver so that she/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should be about **14 - 16 (fourteen to sixteen) student engagement hours** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

Prepare charts on Particular System or Component Overhauling procedure chart with figure.
Prepare layout of authorized automobile workshop with considering important parameter required, rules and safety standards.
Comparative study on Two wheeler (Parameter – specification and its components).
Comparative study on Three wheeler (Parameter – specification and its components).
Prepare chart of Automotive industry revolution 4.0.
Prepare Visit report of automobile workshop.
Prepare chart of vehicle maintenance schedules of each vehicle.
Prepare a working circuit of any one of the following. <ul style="list-style-type: none"> • Horn • Front head lamp (High and low beam) • Flasher unit • Turn indicator • Brake light

- Door lights
- Parking lights
(Prepare simple circuit using available resources, e.g. Can use LED instead of lamps)

Information search can be done through manufactures catalogue website, books, magazine etc.

Following topics are suggested

- Automotive gasket and sealants
- Engine coolant and additives
- Different filters
- Types of bearing used in automobile
- Engine oil

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Automobile Mechanics	William Crouse	Tata Mc-Graw Hill Publication ISBN-13:978-0-07-063435-0
2	Automotive Technology	James D Halderman	Pearson Education ISBN-10: 0-13-254261-7 ISBN-13: 978-0-13-254261-6
3	Two And Three Wheeler Technology	Dhruv U Panchal	PHI learning pvt.Ltd. ISBN-13: 978-8120351431
4	Vehicle maintenance and garage practice	Jigar A Joshi Dhruv U Panchal Jayesh P Maniar	PHI learning pvt.Ltd ASIN : B00LPGBTG2

14. SOFTWARE/LEARNING WEBSITES

- a) <https://www.howacarworks.com>
- b) <https://swayam.gov.in>
- c) <https://auto.howstuffworks.com>
- d) <https://nptel.ac.in>
- e) <https://tinyurl.com/mwxcwd94> for video link
- f) <https://tinyurl.com/rrc7ts3v> for web link

15. PO-COMPETENCY-CO MAPPING

Semester IV	Automobile professional practice-1 (4340205)						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/development of solutions	PO 4 Engineering Tools, Experimentation & Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life-long learning
<ul style="list-style-type: none"> Perform professional duties in automotive workshop/garage effectively. 	3	2	1	3	2	2	2
a) Carryout vehicle inspection and maintenance work with safety.	3	2	1	3	2	3	2
b) Maintain the workshop documentation and records.	3	-	1	-	3	3	2
c) Perform maintenance procedure of the two and three-wheeler automotive system.	3	-	-	2	2	-	2
d) Describe industrial revolution and industrial internet of things.	3	-	-	-	3	2	2
e) Develop professional skills.	3	-	-	-	-	3	3

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE**GTU Resource Persons**

S. No	Name and Designation	Institute	Contact No.	Email
1	Mr. D. A. Dave (Retd. HOD Automobile)	Sir B.P.T.I, Bhavnagar	9427182407	deven_a_dave@yahoo.co.in
2	Mr. V. B. Patel Lect. Automobile	Govt. Polytechnic, Ahmedabad	9428218788	vishalpatel@gpahmedabad.ac.in
3	Mr. D. J. Gohel Lect. Automobile	C. U. Shah Polytechnic, Surendranagar	9879428562	djgohel80@gmail.com
4	Mr. B. B. Prajapati Lect. Automobile	Govt. Polytechnic, Ahmedabad	9825109959	write2bprajapati@gmail.com
5	Mr. B. B. Chauhan Lect. Automobile	Sir B.P.T.I, Bhavnagar	9427233866	bbcautodept@gmail.com

GTU BOS and Branch Co-ordinator Persons

Sr. No	Name and Designation	Institute	Contact No.	Email
1	Mr. Shyam Varghese HOD Automobile Branch Co-ordinator	Sir B.P.T.I, Bhavnagar	94263 96640	shyamvarghese@gmail.com
2	Mr. A. K. Nanavati, HOD Automobile	Govt. Polytechnic, Ahmedabad	9426674409	aknanavati@gmail.com