



**UTTARAKHAND BOARD OF TECHNICAL EDUCATION**  
**JOINT ENTRANCE EXAMINATION AND TRAINING, RESEARCH DEVELOPMENT CELL, DEHRADUN**  
**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME**

**BRANCH NAME – MECHANICAL (AUTOMOBILE) ENGINEERING**

**SEMESTER – VI**

Subject Code	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks	Credit Point
						Internal		External					
						Theory	Practical	Theory		Practical			
						Max Marks	Max Marks	Max Marks	Hrs.	Max Marks	Hrs.		
Period/Weeks		Max Marks	Max Marks	Max Marks	Hrs.	Max Marks	Hrs.	Total Marks	Credit Point				
136001	Entrepreneurship Development & Management*	5	-	-	5	20	-	80	2.5	-	-	100	5
266001	Mechanics of Vehicle**	4	-	2	6	30	20	80	2.5	30	3.0	160	5
266004	Vehicle Air Conditioning	4	-	2	6	30	20	80	2.5	30	3.0	160	6
266003	Automotive Pollution & Control	5	-	-	5	30	-	80	2.5	-	-	110	5
266002	Overhauling Practice Lab**	-	-	6	6	-	30	-	-	80	3.0	110	4
266005	Project Work	-	-	12	12	-	100	-	-	135	3.0	235	7
266052	Industrial Exposure (Assessment at Institute Level)+	-	-	-	-	-	25	-	-	-	-	25	1
016054	General Proficiency#	-	-	4	4	-	25	-	-	-	-	25	1
016055	Employability Skills	4	-	-	4	25	-	50	2.5	-	-	75	1
<b>TOTAL</b>		<b>22</b>	<b>-</b>	<b>26</b>	<b>48</b>	<b>135</b>	<b>220</b>	<b>370</b>	<b>-</b>	<b>275</b>	<b>-</b>	<b>1000</b>	<b>35</b>

\* Common with diploma courses in 6th Sem Mechanical, Mechanical (Production), Production and Automobile Engineering.

# General Proficiency will comprise of various co-curricular activities like games, hobby, clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department.

Note: 1- Each period will be 50 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 12.5 weeks.+Industrial Visit

**Branch Code - 26**



**SIXTH SEMESTER  
MECHANICAL (AUTOMOBILE) ENGINEERING**





<b>L</b>	<b>T</b>	<b>P</b>
<b>5</b>	<b>-</b>	<b>-</b>

**Subject Code : 136001**

## **RATIONALE**

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

## **DETAILED CONTENTS**

### **SECTION – A            ENTREPRENEURSHIP**

#### **1. Introduction**

**23 periods**

- Concept/Meaning and its need
- Qualities and functions of entrepreneur and barriers in entrepreneurship
- Sole proprietorship and partnership forms of business organisations
- Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC: MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

#### **2. Market Survey and Opportunity Identification**

**17 periods**

- Scanning of business environment
- Salient features of National and State industrial policies and resultant business opportunities
- Types and conduct of market survey
- Assessment of demand and supply in potential areas of growth
- Identifying business opportunity
- Considerations in product selection

#### **3. Project report Preparation**

**14 periods**

- Preliminary project report
- Detailed project report including technical, economic and market feasibility
- Common errors in project report preparations
- Exercises on preparation of project report

## **SECTION – B                    MANAGEMENT**

### **4. Introduction to Management**

**06 periods**

- Definitions and importance of management
- Functions of management: Importance and Process of planning, organising, staffing, directing and controlling
- Principles of management (Henri Fayol, F.W. Taylor)
- Concept and structure of an organization
- Types of industrial organisations
  - a) Line organisation
  - b) Line and staff organisation
  - c) Functional Organisation

### **5. Leadership and Motivation**

**05 periods**

- a) Leadership
  - Definition and Need
  - Qualities and functions of a leader
  - Manager Vs leader
  - Types of leadership
- b) Motivation
  - Definitions and characteristics
  - Factors affecting motivation
  - Theories of motivation (Maslow, Herzberg, McGregor)

### **6. Management Scope in Different Areas**

**10 periods**

- a) Human Resource Management
  - Introduction and objective
  - Introduction to Man power planning, recruitment and selection
  - Introduction to performance appraisal methods
- b) Material and Store Management
  - Introduction functions, and objectives
  - ABC Analysis and EOQ
- c) Marketing and sales
  - Introduction, importance, and its functions
  - Physical distribution
  - Introduction to promotion mix
  - Sales promotion

- d) Financial Management
  - Introductions, importance and its functions
  - Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT

## 7. Miscellaneous Topics

05 periods

- a) Customer Relation Management (CRM)
  - Definition and need
  - Types of CRM
- b) Total Quality Management (TQM)
  - Statistical process control
  - Total employees Involvement
  - Just in time (JIT)
- c) Intellectual Property Right (IPR)
  - Introductions, definition and its importance
  - Infringement related to patents, copy right, trade mark

**Note:** In addition, different activities like conduct of entrepreneurship awareness camp extension lectures by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organised.

## INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

## RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi
4. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi

5. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.

#### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted(Periods)	Marks Allotted (%)
1	23	30
2	17	20
3	14	15
4	06	10
5	05	05
6	10	15
7	05	05
<b>Total</b>	<b>80</b>	<b>100</b>

<b>L</b>	<b>T</b>	<b>P</b>
<b>4</b>	<b>-</b>	<b>2</b>

**Subject Code : 266001****RATIONALE**

Various types of motions, power transmission, forces acting on moving vehicle, vehicle braking, balancing and vibration in rotating body are some of the concepts which are essential for diploma holders in Automobile Engineering. Hence the subject is introduced in the syllabus.

**DETAILED CONTENTS****1. Simple Mechanism****12 periods**

- Definition of link, kinematic pair, kinematic chain, Mechanism, inversions and machines
- Simple examples of mechanism with:-
- Lower pairs, Four bar chain, Slider crank chain, Double slider crank chain, Higher pairs

**2. Power Transmission****14 periods**

- Flat belt, V-belt and chain drives.
- Ratio of tension of two sides of the belt with and without centrifugal tension.
- Horse power transmitted and condition for maximum horse power transmitted.
- Simple, compound and epicyclic gear box

**3. Vehicle in Motion****14 periods**

- Air, grade, and rolling resistances
- Tractive effort, traction, Inertia load, Draw bar pull and power required to propel a vehicle
- Calculations of acceleration and tractive effort required in case of front wheel drive, rear wheel drive and four wheel drive
- Centrifugal force and its effect on vehicle stability on banked and unbanked road

**4. Vehicle Control****12 periods**

- Braking friction and limits of braking



- Retardation and Braking force, calculations in case of front wheel, rear wheel and all wheel braking
- Weight transfer during braking
- Stopping distance and stopping time
- Davis and Ackermann Steering Mechanism, Correct Steering angle

## **5. Balancing**

**12 periods**

- Concepts of static and dynamic balancing, working of static and dynamic machine
- Balancing of rotating masses-single rotating mass by a single mass rotating in the same plane and by two masses rotating in different planes, balancing of several masses rotating in the same plane. Balancing of several masses rotating in different planes

## **LIST OF PRACTICALS**

1. To study various types of Links, Pairs, Chain and Mechanism
2. To study inversion of Four Bar Mechanism, Single Slider Crank Chain Mechanism and Double Slider Crank Chain Mechanism.
3. To study various kinds of belts drives.
4. To study Different types of Gears.
5. To study Different types of Gear Trains.

## **INSTRUCTIONAL STATREGY**

1. Models should be shown
2. Practical demonstrations should be organized

## **RECOMMENDED BOOKS**

1. Theory of Machines by R.S. Khurmi
2. Automobile Engineering Vol-I, II, Dr. Kirpal Singh, Standard Publishers and Distributor.
3. Theory of Machines by D.R. Malhotra; Satya Parkashan
4. Theory of Machines by PL Balaney; Khanna Publishers, Delhi
5. Mechanics of Vehicles by W. Steed; Kafe books Limited, London

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted(Periods)</b>	<b>Marks Allotted (%)</b>
1	12	20
2	14	25
3	14	25
4	12	15
5	12	15
<b>Total</b>	<b>64</b>	<b>100</b>

# VEHICLE AIR CONDITIONING

L	T	P
4	-	2

Subject Code : 266004

## RATIONALE

In teaching fundamentals of air conditioning, vehicle air conditioning is essential topic. The student will learn about car air conditioning which nowadays implemented in vehicles excessively. The subject is modified in its name to make it more appropriate to automobile field.

## DETAILED CONTENTS

- 1. Concept of Refrigeration** **08 periods**  
Refrigeration, Schematic layout of a refrigeration system, concept of heat pump and heat engine, C.O.P., second law of thermodynamics applicable to refrigeration, reversed Carnot cycle, Bell Coleman cycle, calculation of work done required, net refrigeration effect, C.O.P
- 2. Vapour Compression Refrigeration System** **10 periods**  
Basic components of vapour compression refrigeration system and their function: compressor, condenser, expansion device and evaporator.
- 3. Vapour Absorption Refrigeration System** **10 periods**  
Basic components of vapour absorption refrigeration system and their function: generator, Pump, condenser, expansion device and evaporator.
- 4. Commonly Used Refrigerants** **08 periods**  
Definition, primary and secondary refrigerants, designation of refrigerant, examples of each type. Desirable properties of good refrigerant, Azeotropic mixtures.
- 5. Air Conditioning** **11 periods**  
Air conditioning, its meaning, need for air conditioning, types of air conditioning, Properties of air to be regulated during air conditioning. Basic Car air conditioning system: Location of air conditioning components in a car.
- 6. Psychometry** **11 periods**  
Psychometric - definition, terminology, psychometric charts and tables, use psychometric charts for solving simple problems.

## 7. Maintenance of Vehicle Air-Conditioning System(VACS) 06 periods

Various types of common troubles in VACS, Possible causes for each trouble & possible remedies.

### LIST OF PRACTICALS

1. Study of Heat Pump, Heat Engine & Refrigerator
2. Study of Carnot Cycle
3. Study of Vapour compression refrigeration system
4. Study of Vapour absorption refrigeration system
5. Study of Vehicle Air Conditioning system
6. Various types of common troubles in VACS, Possible causes for each trouble & possible remedies

### INSTRUCTIONAL STRATEGY

1. Use computer based learning aids for teaching learning
2. Demonstrations should be made to explain the concepts

### RECOMMENDED BOOKS

1. Refrigeration and air conditioning by Sarrao and Gabbi
2. Refrigeration & air conditioning by C. P. Arora.
3. Automotive air conditioning by William H. Crouse & D.L. Anglin, McGraw-Hill Inc.
4. Automotive air conditioning, Paul Weisler, Reston Publishers
5. Refrigeration and air conditioning by R.S. Khurmi

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted(Periods)	Marks Allotted (%)
1	08	10
2	10	20
3	10	20
4	08	10
5	11	15
6	11	15
7	06	10
<b>Total</b>	<b>64</b>	<b>100</b>

L	T	P
5	-	-

**Subject Code : 266003**

## **RATIONALE**

This subject gives knowledge to the students with regards to many kinds of emissions emitted by automotive vehicle. These emissions cause the air pollution & have adverse effect on human beings. This subject deals with study that how we can measure & minimize these emissions.

## **DETAILED CONTENTS**

### **1. Introduction**

**15 periods**

Environment, Atmosphere, Clean air, Pollution, different types of air pollution. Effect of pollution on human health. Role of vehicles in air pollution, types of vehicle emissions: unburned hydrocarbons and exhaust emissions. Brief history of automobile emission control. Emission norms: EURO and BHARAT. Role of state administration to control vehicle emissions.

### **2. Pollutant Formation In SI & CI Engines**

**15 periods**

Pollutant formation in SI & CI Engines, mechanism of HC, CO and NO<sub>x</sub> formation in engines, effects of design and operating variables on engine emission.

### **3. Unburned Hydrocarbon Emission Control**

**20 periods**

**Evaporative Emission Control:** Sources of vapor leakages, Need of vapor recovery systems, Charcoal Canister

**Crankcase Blow by:** Need of removing blow by gases, Open & Closed crankcase ventilation system, function of PCV valve, Construction & working of PCV valve.

### **4. Exhaust Emission Control**

**15 periods**

Composition of exhaust gases, Pollutants in exhaust. Exhaust emission control methods – Air injection, catalytic converter - two way & three way converter, catalysts, Exhaust gas recirculation, function of EGR valve.

### **5. Exhaust Measurement**

**15 periods**

Concept of exhaust measurement for S.I and C.I engines, smoke testing for SI and CI engines. Measurement of CO, HC and NO<sub>x</sub>. Smoke meters – Hartridge & Bosch type, Flame ionization detector (FID), Spectroscopic gas analysers – Non dispersive infrared gas analysers (NDIR).

## INSTRUCTIONAL STRATEGY

1. Use computer based learning aids for teaching learning
2. Demonstrations should be made to explain the concepts

## RECOMMENDED BOOKS

1. Heldt P.M., “High Speed Combustion Engines”, Oxford IBH Publishing Co., Calcutta,
2. William H.Crouse, “Automotive Engines”, McGraw-Hill Publishers,
3. Ellinger H.E., “Automotive Engines”, Prentice Hall Publishers,
4. John B.Heywood, “Internal Combustion Engine Fundamental”, McGraw-Hill,
5. Ganesan.V. “Internal Combustion Engines”, Tata McGraw-Hill Publishing Co.,
6. M.L. Mathur and R.P. Sharma, “A course in Internal combustion engines”, Dhanpat Rai & Sons Publications, New Delhi
7. Automobile Engineering by P.S. Gill
8. Automobile Engineering Vol. 1 & 2 by Dr. Kripal Singh; Standard Publishers Distributors,
9. Automobile Engineering by R.B. Gupta; Satya Prakashan, New Delhi.
10. Automobile Engineering by K.M. Gupta, Umesh Prakashan, Delhi.

## SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted(Periods)	Marks Allotted (%)
1	15	10
2	15	25
3	20	30
4	15	20
5	15	15
<b>Total</b>	<b>80</b>	<b>100</b>

<b>L</b>	<b>T</b>	<b>P</b>
-	-	<b>6</b>

**Subject Code : 266002**

### **RATIONALE**

Automobile overhauling and troubleshooting forms the main job of a diploma holder in automobile engineering. The competencies in knowing the faults and reconditioning of various components and accessories of automobile will go a long way in instilling confidence for a diploma holder. The practice in above areas has thus been included in the curriculum.

### **DETAILED CONTENTS**

1. Diagnosing the engine for overhauling
2. Removal of engine from vehicle
3. Dismantling of engine
4. Overhauling of petrol engine
5. Overhauling of diesel engine
6. Decarbonising of engine blocks, combustion chamber, piston crown and valve parts.
7. Surfacing of cylinder heads, cylinder blocks and manifolds on cylinder head refacing machine
8. Replacing of piston and piston rings – removal and refitting
9. Practice on cylinder boring machine
10. Practice in fitting cylinder liners- sleeving and desleeving
11. Testing and aligning of connecting rod
12. Overhauling of valves and valve mechanism
13. Overhauling of gear box
14. Overhauling of differential and propeller shaft
15. Overhauling of wheels and axles
16. Overhauling of brakes
17. Overhauling of clutch

### **INSTRUCTIONAL STRATEGY**

1. Use computer based learning aids for teaching learning
2. Demonstrations should be made to explain the concepts

## **RECOMMENDED BOOKS**

1. Automobile Engineering by Dr. Kirpal Singh; Standard Publisher, Delhi.
2. Automobile Engineering by Sh. R.B. Gupta; Satya Prakashan, New Delhi.
3. Maintenance and Repair of Motor Vehicle by H.O. Geneva; Dialogue, R-686, New Rajinder Nagar, New Delhi.
4. Automotive Mechanics by William H. Crouse, Tata McGraw Hill, Delhi.
5. Auto Mechanics: Theory & Service by W.J.deKryger et al.



## PROJECT WORK

L	T	P
-	-	12

**Subject Code : 266005**

### RATIONALE

Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given for a group. The students should identify or given project assignment at least two to three months in advance. The project work identified in collaboration with industry may be preferred.

### DETAILED CONTENTS

Each teacher is expected to guide the project work of 5-6 students.

- Projects related to repair and maintenance of automobiles
- Projects related to increasing productivity
- Projects related to quality assurance
- Projects related to estimation and economics of production
- Projects connected with repair and maintenance of plant and equipment
- Projects related to identification of raw material thereby reducing the wastage
- Any other related problems of interest of host industry

A suggestive criteria for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	Max. marks %	Rating Scale				
			Excellent	Very Good	Good	Satisfactory	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
<b>Total marks</b>		<b>100</b>	<b>100</b>	<b>80</b>	<b>60</b>	<b>40</b>	<b>20</b>

The overall grading of the practical training shall be made as per following table

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	65-80	Very good
iii)	50-64	Good
iv)	41-49	Fair
v)	Less than 40	Poor

In order to qualify for the diploma, students must get “Overall Good grade” failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented/project work professional training in the same industry and re-evaluated before being disqualified and declared “not eligible to receive diploma”. It is also important to note that the students must get more than six “goods” or above “good” grade in different performance criteria items in order to get “Overall Good” grade.

### Important Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.
2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.

3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.
4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.

# EMPLOYABILITY SKILLS

L	T	P
4	-	-

**Subject Code : 016055**

## RATIONALE

Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workplace. This subject is included to develop employability skills amongst the students.

## DETAILED CONTENTS

**Unit I:** (06 periods)

- Technical Education & Industrial scenario.
- Competency required of an engineer.

**Unit II:** (06 periods)

- Professional Engineer desirable values and ethics and their development.
- Relation between engineering profession, society and environment

**Unit III:** (12 periods)

### Effective Communication

- Reading & Active Listening Skills
- Speaking
- Writing
- Presentation Technique/Seminar
- Group discussion

**Unit IV:** (12 periods)

### Managing project

- Leadership
- Motivation
- Time management
- Resource management
- Interpersonal relationship

**Unit V:** (10 periods)

### Preparing for Employment

- Searching for job/job hunting

- Resume & CV Writing
- Interview technique in personal interview telephonic interview, panel
- Interview, group interview, video conferencing

#### **Unit VI:**

**(08 periods)**

##### **Self Management**

- Self awareness
- Stress Management
- Conflict resolution

#### **Unit VII:**

**(06 periods)**

- Creativity, Innovation and Intellectual property right
- Concept and need in present time for an engineer

#### **Unit VIII:**

**(04 periods)**

##### **Rules & Ethics**

- Basic rules, laws and norms to be adhered by engineers during their working

#### **LIST OF PRACTICAS**

- Steps how to effectively write different types of Letters.
- Steps to make a Presentation in Power Point.
- Steps to make a Resume more effective.
- Steps to conduct Telephonic/On-line Interview (Through skype/Google Hangout).
- Study of Different Techniques of Stress Management.
- Study of Rules & Ethical practices to be followed at Workplace.

#### **RECOMMENDED BOOKS**

- Employability skills by Kapil Dev, Vishnu P. Singh Asian Pub. New Delhi
- Employability skills for Diploma students by Dr. S.K. Singh, Vayu Education, New Delhi

### SUGGESTED DISTRIBUTION OF MARKS

<b>Unit No.</b>	<b>Time Allotted (Periods)</b>	<b>Marks Allotted(%)</b>
1	06	10
2	06	10
3	12	18
4	12	18
5	10	16
6	08	12
7	06	10
8	04	6
<b>Total</b>	<b>64</b>	<b>100</b>









## LEARNING OUT COMES AND MEANS OF ASSESSMENT

**BRANCH NAME – MECHANICAL (AUTOMOBILE) ENGINEERING**

**SEMESTER – VI**

S.N0.	Title of Subject/Unit	Learning Outcomes	Means of Assessment
1	Entrepreneurship Development And Management	After successful completion of this course, students will be able to: 1. discern distinct entrepreneurial traits 2. assess opportunities and constraints for new business ideas 3. Understand the systematic process to select and screen a business idea 4. design strategies for successful implementation of ideas 5. write a business plan	1. Technical quizzes 2. Class test 3. Question & answer 4. Practical performance by students. 5. Mid Term Exam and Semester examination.
2	Mechanics Of Vehicle	After successful completion of this course, students will be able to: 1. Know the basics of mechanism and perform kinematic analysis. 2. Understand belt drives (flat belt, V-belt), chain drives, rope drives, belt drive pulleys & chain sprockets. 3. Understand Air, grade & Rolling resistance when vehicle in motion. 4. Balance rotating and reciprocating masses in engines 5. Understand Retardation and Braking Force and its calculation	1. Technical quizzes 2. Class test 3. Question & answer 4. Practical performance by students. 5. Mid Term Exam and Semester examination. 6. Practical assessment is done through practical test results, practical files and Viva voce
3	Vehicle Body Engineering	After successful completion of this course, students will be able to: 1. understand various refrigeration cycles 2. illustrate the fundamental principles and applications of refrigeration and air conditioning system 3. present the properties, applications and environmental issues of different refrigerants	1. Technical quizzes 2. Class test 3. Question & answer 4. Practical performance by students. 5. Mid Term Exam and Semester examination.

		<ol style="list-style-type: none"> <li>4. use Psychometric charts</li> <li>5. operate and analyze the vehicle air conditioning System.</li> <li>6. Explain vapor compression systems and different processes, equipment.</li> <li>7. Explain psychrometric properties and processes, and air conditioning process.</li> <li>8. Explain vapor absorption systems and different processes, equipment.</li> </ol>	<ol style="list-style-type: none"> <li>6. Practical assessment is done through practical test results, practical files and Viva voce</li> </ol>
4	Automotive Pollution And Control	<p>After successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the current scenario of Automobile Emissions and standards.</li> <li>2. Gain knowledge about the formation of Emissions from SI Engines.</li> <li>3. Gain knowledge about the formation of Emissions from CI Engines.</li> <li>4. Understand Emission and control Techniques in SI and CI Engines.</li> <li>5. Understand measuring techniques of Emission and test procedure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Technical quizzes</li> <li>2. Class test</li> <li>3. Question &amp; answer</li> <li>4. Practical performance by students.</li> <li>5. Mid Term Exam and Semester examination</li> </ol>
5	Overhauling Practice Lab	<p>After successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Gain knowledge about vehicle operation and maintenance, service schedules etc.,</li> <li>2. Gain skills in handling situations where the vehicle is likely to fail.</li> <li>3. Understand maintenance procedures like repairing, overhauling etc.,</li> <li>4. Understand the concept of fault diagnosis.</li> <li>5. Understand the various advances in fault diagnosis</li> </ol>	<ol style="list-style-type: none"> <li>1. Service Station Visit</li> <li>2. Assignments</li> <li>3. Technical quizzes</li> <li>4. Seminars,</li> <li>5. Practical assessment is done through practical test results, practical files and Viva voce</li> </ol>

6	PROJECT WORK	<p>After successful completion of this course, students will be able to</p> <ol style="list-style-type: none"> <li>1. Develop the ability to solve a specific problem right from its identification</li> <li>2. Literature review till the successful solution of the same</li> <li>3. Preparing project reports and to face reviews and viva voce examination.</li> <li>4. A position to take up any challenging practical problems</li> <li>5. Find solution by formulating proper methodology</li> </ol>	<ol style="list-style-type: none"> <li>1. Seminars</li> <li>2. Power Point Presentation</li> <li>3. Semester examination.</li> <li>4. Synopsis</li> <li>5. Project Report</li> </ol>
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