



**Dr. Babasaheb Ambedkar
Marathwada University,
Aurangabad (MS)**

Deen Dayal Upadhyay KAUSHAL Kendra

**Curriculum of B.Voc (Choice
Based Credit System)
(Automobile)**



Curriculum for Bachelor in Vocation (B.Voc.)

(Choice Based Credit System)

This Bachelor in Vocation programme is divided into six semester shaving 192 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 Components** viz. Linguistic Proficiency, Computer Science, Environment Management, Business & Accounting, Industrial Ethics and Safety Management, Statistical Tools, Commerce & Management Fundamentals and **Skill Development Components** 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 Objectives (PEO):

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

1. 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.
2. Have a broad based background to practice Automobile technology in the areas of Automobile Manufacturers, Service Industry, Autotronics, Auto Ancillary industry and Government sectors meeting the growing expectations of stakeholders.
3. Have an ability to pursue higher studies and succeed in academic and professional careers.
4. 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.
6. 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 well-defined Automobile related problems.

PO 2. Discipline knowledge & Problem Analysis: Apply transboundary knowledge of a broad spectrum of technology that encompasses (but not limited to) electronics, mechnronics, 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 Outcomes (PSO):

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

1. 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-

<i>Exit Point</i>	<i>Duration</i>	<i>Diploma / Degree to be Offered</i>
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:

Automobile, Industrial Automation:

Those who have completed 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 degree program.

Admission / Promotion Process:

In response to the advertisement for registration, interested students will have to register themselves for a Common Entrance Test (CET). Admission will be done on the basis of performance of students at Common Entrance Test (CET). The CET will be conducted in the month of June every year.

A candidate who has sought admission to Semester – I shall be admitted to Semester – II automatically (provided, he submits an application to that effect). 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 in the Fifth semester. However, if a candidate has not passed the First and Second Semester examinations, he shall not be allowed to take admission in the Fifth Semester. Appearance in the First, Third and Fifth semester is compulsory to get promoted to next semester.

Dropout students will be allowed to register for second or third year as and when

the concerned courses are offered by the Centre, however he/she should not exceed more than twice the duration of the course from the date of first registration at the Centre. Therefore, for obtaining B. Voc. degree a student will have to complete all semesters successfully within 6 years/12 semesters.

Choice Based Credit System (CBCS):

The choice based credit system is going to be adopted by this Centre. 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 periods of 60 minutes each 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 DDU-KK will monitor the smooth functioning of the programme.

Results Grievances / Redressal Committee

Grievances / redressal committee will be constituted in the department to resolve all grievances relating to the evaluation. The committee shall consist of Director of DDU-KK, 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 50: 50 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. However, if a student fails in CIA (considering independent CIA score) he/she may appear for the same CIA at his/her own responsibility in the next academic year , when the same course is offered during regular academic session.
- In case a student fails in certain course(s) in a particular semester and the same course(s) are modified/ revised/ removed from the curriculum in due course, the student will have to appear as per the newly framed curriculum and/or pattern in subsequent semester, at his/her own responsibility.

Continuous Internal Assessment (CIA):

(A) For 4 credit courses-

- There will be 20 marks for Continuous Internal Assessment. Distribution. 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 sets will be considered for final marks-memo preparation. The setting of question papers and the assessment will be done by concerned teacher.

(B) For 2 credit courses-

- Two internal tests (of 10 marks each) will be conducted after completion of 40% and 80% of the curriculum respectively. Average performance of the two sets 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, whereas, for 2 credit theory course, the same will be of 40 marks. Therefore, the total marks shall be 100 for 4 credit theory course (80 marks semester end exam + 20 marks CIA) and 50 for 2 credit theory course (40 marks semester end exam + 10 marks CIA).
- Semester end examination (SEE) time table will be declared by the departmental committee (as per the university annual calendar). The paper setting and assessment of theory courses, laboratory courses and project will done by external (50 %) and internal (50%) examiners. However, in case of non-availability of external examiner for either paper setting or assessment or both, department committee will be empowered to take appropriate decision.
- Pattern of semester end question paper will be as below:

(A) 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 sentence) as compulsory questions and it should cover entire course curriculum (20 Marks)
- Part B contains 7 questions of 12 marks each (with more or less equal weightage on every module). Students will have to attempt 05 questions out of 07 (60 marks)
- 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.

(A) For 2 credit courses-

- The semester end examination of theory course will have two parts (10+30 = 40 Marks)
- Part A will be consisting of 10 questions having 1 marks each (multiple choice questions / fill in the blanks/ answer in sentence) as compulsory questions and it should cover entire course curriculum (10 Marks)
- Part B will carry 5 questions Of 10 marks each (with more or less equal weightage on every module).Students will have to attempt 3 questions out of 5(30 marks).
- 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.

- Assessment of laboratory courses and project will carried out at end of semester Student must perform at least eight experiments from each laboratory course. The semester end practical examination will be conducted at the end of each semester along with the theory examination.
- At the end of each semester, the Departmental Committee will assign grades to the students.
- The Director of the Centre shall send all results to the Controller of Examination for further processing.
- Every student will have privilege for revaluation of answer sheets or recounting of marks for each semester end examination. However, students will have to submit an application within 15 days from the date of declaration of results.
- Applications received for revaluation / recounting will be discussed in the Departmental committee and examiners will be appointed accordingly.
- The results of revaluation / recounting will be approved by Departmental committee and forwarded to Controller of Examination for further processing.

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 Master 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	O	Outstanding
80-89	8.00-8.90	A ⁺⁺	Exceptional
70-79	7.00-7.90	A ⁺	Excellent
60-69	6.00-6.90	A	Very Good
55-59	5.50-5.90	B ⁺	Good
50-54	5.00-5.40	B	Fair
45-49	4.50-4.90	C ⁺⁺	Average (Above)
41-44	4.1-4.49	C	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

$$\text{SGPA} = \frac{\text{Sum (Course Credits) X Number of Grade Points in concerned Course Gained by the Student}}{\text{Sum (Course Credits)}}$$

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.

$$\text{CGPA} = \frac{\text{Sum (All six Semester SGPA)}}{\text{Total Number of Semester}}$$

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.

Course Structure (B.Voc. Automobile)

Paper No	Paper Title	Credits
Semester – I		
General Education Components (A)		
VOC 101	Linguistic Proficiency-I (English Marathi) with Language lab training	4
VOC 102	Computer Fundamentals-I (Information Technology) : Theory	2
VOC 103	Auto Service Technician (Theory)	2
VOC 104	Auto Service Technician (Practical)	
VOC 105	Occupational Practice Essentials	4
Skill Development Components (B)		
VOC 131	Automobile Technology	2
VOC 132	Automotive Tools and Equipments	2
VOC 133	Workshop Technology	2
VOC 134	Engineering Drawing	2
VOC 135	Laboratory Course –I (AU)(Automobile Technology)	2
VOC 136	Laboratory Course –II (AU) (Automotive Tools and Equipments)	2
VOC 137	Laboratory Course – III (AU) (Workshop Technology)	2
VOC 138	Laboratory Course – IV (AU) (Engineering Drawing)	2
Total Credits = General Education Components + Skill Development Components		12+16 =28
Semester – II		
General Education Components (A)		
VOC 201	Linguistic Proficiency- II (English and Hindi) with Language Lab	4
VOC 202	Computer Fundamentals- II (Basic Computer Hardware system)	2
VOC 203	Computer Fundamentals- II (Laboratory Course)	2
VOC 204	Environment Management	4
Skill Development Components (B)		
VOC 231	Engine System	2
VOC 232	Engineering Material	2
VOC 233	Manufacturing Processes	2
VOC 234	Engineering Drawing - II	2
VOC 235	Laboratory Coursework based on Engine System	2
VOC 236	Laboratory Coursework based on Two wheeler servicing	2
VOC 237	Laboratory Coursework based on Workshop practices	2
VOC 238	Laboratory Coursework based on Engineering Drawing - II	2
VOC 239	In-plant Training – II (AU)	4
Total Credits = General Educational Components + Skill Development Components		12+20 =32

Semester – III		
General Education Components (A)		
VOC 301	Linguistic Proficiency-III	4
VOC 302	Business Software Tools –I	4
VOC 303	Statistical Tools (Probability and Statistics)	4
Skill Development Components (B)		
VOC 331	Machine Drawing	2
VOC 332	Thermodynamics	2
VOC 333	Automotive Petrol Engines	2
VOC 334	Automotive Diesel Engines	2
VOC 335	Laboratory Coursework based on Machine Drawing	2
VOC 336	Laboratory Coursework based on Automotive Petrol Engines	2
VOC 337	Laboratory Coursework based on Automotive Diesel Engines	2
VOC 338	Laboratory Coursework based on Two-wheeler Overhauling	2
Total Credits = General Education Components + Skill Development Components		12+16 =28
Semester – IV		
General Education Components (A)		
VOC 401	Industrial Ethics and Safety Management	4
VOC 402	Business Software Tools-II	4
VOC 403	Fundamentals of Business and Accounting	4
Skill Development Components (B)		
VOC 431	Fundamentals of Mechanisms	2
VOC 432	Automobile Transmission	2
VOC 433	Auto Electrical systems	2
VOC 434	Automobile Systems	2
VOC 435	Laboratory Coursework based on Automobile Transmission	2
VOC 436	Laboratory Coursework based on Auto Electrical systems	2
VOC 437	Laboratory Coursework based on Automobile systems	2
VOC 438	Laboratory Coursework based on Auto-CAD	2
VOC 439	Laboratory Coursework based on In-plant Internship/Field Work/ Mini-Project-IV	4
Total Credits = General Education Components + Skill Development Components		12+20= 32

Semester – V		
General Education Components (A)		
VOC 501	Personality Development and Stress Management	4
VOC 502	Operations Management	4
VOC 503	Business Communication	2
VOC 504	Production Engineering	2
Skill Development Components (B)		
VOC 531	Vehicle Testing	2
VOC 532	Engine Diagnostics and Troubleshooting	2
VOC 533	Metrology	2
VOC 534	Hydraulic and Pneumatic	2
VOC 531 A	Fuel Testing and Standards	2
VOC 532 A	Heat, Ventilation, and Air conditioning (HVAC)	2
VOC 535	Laboratory Coursework - Engine Diagnostics and Troubleshooting	3
VOC 536	Laboratory Coursework – Hydraulic and Pneumatic	3
VOC 535 A	Laboratory Coursework - Engine and Fuel Testing Laboratory	3
VOC 537	Major Project – Phase I	2
VOC 538	In-plant Training/Field work/Mini Project – V (AU)	2
Total Credits = General Education Components + Skill Development Components		12+18= 30
Semester - VI		
General Education Components (A)		
VOC 601	Foreign Language(German/Chinese/Japanese/Russian)	4
VOC 602	Entrepreneurship Development	4
VOC 603	Production Management	4
Skill Development Components (B)		
VOC 631	Autotronics	2
VOC 632	Farm Equipment and Machinery	2
VOC 633	Transport Management and safety regulation	2
VOC 634	Automotive Component Design	2
VOC 631 A	Electric and Hybrid Vehicles	2
VOC 632 A	Intelligent Vehicle Technology	2
VOC 635	Laboratory Coursework – Wheel Alignment and Balancing	3
VOC 636	Laboratory Coursework – Solid Modelling	3
VOC 635 A	Laboratory Coursework - Suspension system laboratory	3
VOC 637	Major Project – Phase II	2
VOC 638	In-plant Training/Field work/Mini Project – IV (AU)	2
Total Credits = General Education Components + Skill Development Components		12+18= 30
Total Credits (Semester I to VI)		180

In Semester V, students have to opt for either course group I- (VOC 531, VOC 532, VOC 535) or course group II- (VOC 531A, VOC 532A , VOC 535A) In Semester VI, students have to opt for either course group I- (VOC 631, VOC 632, VOC 635) or course group II- (VOC 631A, VOC 632A , VOC 635A)

Paper Code Description:

Each course will be identified by a unique three digit code.

The first digit refers to Semester.

The second digit refers to General academic component or Skill Development Component (according to specialization / trade) as per following scheme of nomenclature

0 - Refers to General paper / course

3 - Refers to Automobile

Third digit refers to incremental number for paper / course of respective semester.

Semester – I

General Academic Components

Semester – I

General Education Components

VOC 101: Linguistic Proficiency-I (English and Marathi) with language lab training (4 Credits: 100 Marks)

Course Outcomes:

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

1	Define and Differentiate between different tenses in English Define different types of linguistic expressions in Marathi
2	Apply concept of tenses to formulate correct sentences in English Apply proper linguistic expression in Marathi to address situational demand
3	Describe basic rules of Pronunciations and phonetic subscriptions in English
4	Formulate different types of dialogues, expression of ideas/information in English and Marathi to address situational demand
5	Compose applications, reports, requests, responses, summary and comprehensions in English and Marathi

Part A: BASIC STRUCTURE OF THE ENGLISH LANGUAGE

Module I Tenses

(8 Hours)

1. Present tense (includes all four types of tenses each)
2. Past tense
3. Future tense

Module II Spoken English:

(6 Hours)

1. Basic of pronunciation : Vowels, diphthongs,
2. Certain basic sounds including th, dh, gh sounds, fricatives etc.
3. Differences in the sounds of the letters, especially, w/v, f/ph etc.
4. Phonetic transcriptions.
- 5.

Module – III

(8 Hours)

1. Introducing yourself (The communicator)
2. Introducing people to others
3. Giving personal information
4. Getting people's attention and interrupting
5. Giving instructions and seeking clarifications
6. Making requests and responding to requests

References:

1. Business Communicator – V.K. Jain, O. P. Biyani, S. Chand, New Delhi.
2. The Communicator – Board of Editors , Orient Blackswan Pvt. Ltd

3. The Art of Powerful Communication – Dinesh K. Vohra, Are Maria Publications, Pune

**Part B : BASIC STRUCTURE OF THE MARATHI LANGUAGE
(ON NEXT PAGE....)**

उद्दिष्टे -

- १) संज्ञापनाचे स्वरूप आणि प्रकार, संज्ञापन व्यवहारातील भाषेचे महत्त्व आणि कार्य यांचे महत्त्व समजावून देणे.
- २) भाषा व्यवहाराची अपारंपरिक आणि अनौपचारिक क्षेत्रे, औपचारिक भाषा व्यवहाराची क्षेत्रे आणि त्याचे क्षेत्रनिहाय स्वरूप समजावून देणे.
- ३) विविध स्तरावरील भाषिक कौशल्ये आणि क्षमता विकसित करणे.
- ४) प्रसार माध्यमांचे स्वरूप आणि त्यासाठी आवश्यक असलेल्या भाषा व्यवहाराचे स्वरूप समजावून देणे.
- ५) कार्यालयीन / लेखन व्यवहारातील भाषेचे स्वरूप समजावून घेणे.
- ६) परिभाषानिष्ठ भाषाव्यवहार म्हणजेच निरनिराळ्या शास्त्रीय विषयांवरील लेखना करिता
- ७) भाषाव्यवहारातील आधुनिक तंत्रोपकरणांची (व तंत्रांची) माहिती करून देणे, मराठीतून व्यवहार करणाऱ्या संस्थांना भेटी देणे इत्यादी.

घटक४

संज्ञापन व भाषिक कौशल्ये

अ) संज्ञापन म्हणजे काय ? संज्ञापनाचे प्रकार - संज्ञापनातील भाषेचे, महत्त्व आणि कार्य भाषेचे औपचारिक व अनौपचारिक उपयोग.

आ) भाषेची प्राथमिक कौशल्ये (श्रवण, भाषण, वाचन, लेखन)

इ) भाषेची प्रगत कौशल्ये -

- १) वर्णन, कथन, निवेदन, संभाषण, सूत्रसंचालन इ.
- २) आकलन, संक्षेप, विस्तार, भाषांतर, गद्य रूपांतर, संवादलेखन इ.

औपचारिक भाषाव्यवहाराचे विविध प्रकार

- अ) इतिवृत्त, टिप्पणी, अर्जलेखन, कार्यालयीन पत्रलेखन, निवेदन प्रसिध्दीपत्रक, निविदा इ.
- ब) मुलाखत लेखन

स्मरणिका / गौरविका / संस्थापत्रिका / वार्षिक अहवाल इत्यादींचे संपादन

Module V : Tutorials, assignments and presentation based on Module I to IV

संदर्भ पुस्तके:

- १) मराठी शुध्दलेखन प्रदीप - मो. रा. वाळंबे, गो. य. राणे प्रकाशन
- २) मुद्रित शोधन - य. ए. धायगुडे - वि. पूना प्रेस ऑनर्स असो.
- ३) मराठी शुध्दलेखनविवेक - द. न. गोखले - सोऽहं प्रकाशन
- ४) शुध्दशब्दसूची - स्नेहल सावरे - स्नेहवर्धन
- ५) राजभाषापरिचय -
- ६) व्यावहारिक मराठी - पुणेविद्यापीठ
- ७) व्यावहारिक मराठी - ल. रा. नसिराबादकर -फडके बुकसेलर्स,कोल्हापूर
- ८) व्यावहारिक मराठी - प्रकाश परब
- ९) वार्तासंकलन - चंद्रकांत ताम्हणे
- १०) व्यावहारिक मराठी - (संपादकडॉ. स्नेहल सावरे) स्नेहवर्धन प्रकाशन, पुणे

**VOC 102:
Basic Computing**

(2 Credits: 50 Marks)

Course Outcomes:

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

1	Define Elements and Tools of Word Processing, Spreadsheet, Presentation Graphics, DBMS, and Internet in MS-Office
2	Extend the knowledge of basic and advanced tools of Word Processing, Spreadsheet, Presentation Graphics, DBMS, and Internet in MS-Office for specific tasks
3	Apply Word Processing tools to create Notice, Application
4	Use Spreadsheet tools to create and manage attendance sheets
5	Demonstrate Presentation Graphic tools to create, modify and refine presentation
6	Apply DBMS tools create/modify tables/forms, reports
7	Use search engines and write e-mails

Software for Hands-on:

- Windows Vista
- MS Office 2007
- Internet Explorer
- Online collaboration tools

This course offers the following modules:

Module - I: Word Processing

(6 Hours)

- Overview of Word Processing
- Creating and Editing a Document (Exercise 1 - Creating Notice)
- Revising and Refining a Document (Exercise 2 - Revise your notice)
- Using Additional Word Features (Exercise 3 – Creating notice for different classes)
- Changing the Display of the Document (Exercise 4 - Changing the display of your notice)
- Using Mail Merge (Exercise 5 – Sending notice using Mail Merge)
- Using Standard Templates (Exercise 6–Create notice using standard templates)
- Word Processing in Other Languages (Exercise 7 - Creating a notice in Marathi)

Module - II: Spreadsheet and Presentation Graphics

(8 Hours)

- Overview of Excel
- Creating and Editing (Exercise 1 – Creating attendance sheet)
- Using Charts (Exercise 2 – Creating a chart)
- Managing a Workbook (Exercise 3 – Managing Attendance Sheet)
- Overview of Presentation Graphics
- Creating a Presentation (Exercise 1 – Creating a Annual Day Presentation)
- Modifying and Refining a Presentation (Exercise 2 – Modifying and Refining Presentation)
- Using Advanced Presentation Features (Exercise 3 – Advanced Features for Presentation)

Module - III: Database Management Systems

(8 Hours)

- Overview
- Creating a Database (Exercise 1 – Creating a Student Database)
- Modifying a Table (Exercise 2 – Modifying a Student Database)

- Creating Forms (Exercise 3 – Creating Form for Student Database)
- Queries and Reports (Exercise 4 – Creating Report)
- Protecting the Database (Exercise 5 – Protecting a Student Database)

Module - IV: Internet

(8 Hours)

- Internet Basics
- Navigating the Web (Exercise 1 – Navigating the web site)
- Finding Information on the Web (Exercise 2 – Searching result on the web)
- Communication Using E-Mail (Exercise 3 – Communicate result to your friends)

Module - V: Tutorials, assignments and presentation based on Module I to IV

(6 Hours)

References:

1. Microsoft Office Word 2007 a Beginners Guide: A Training Book of Microsoft Word 2007, By W.R. Mills, United States of America, Bloomington, Indiana.
2. Microsoft Office Word 2007: Illustrated Co: Illustrated Complete, By Jennifer A. Duffy, Carol M. Cram
3. Sams Teach Yourself Microsoft Office 2007 All in One, By Greg Perry
4. Microsoft Office Excel 2007: Comprehensive Concepts and Techniques, By Greg B. Shelly, Thomas J. Cashman, Jeffrey J. Quasney.
5. Microsoft Office Power Point 2007: Illustrated Introductory: Introductory, By David Beskeen
6. Microsoft Office Power Point 2007: Top 100 Simplified Tips & Tricks, By Paul McFedries.
7. Microsoft Office Access 2007: Comprehensive Concepts and Techniques, By Thomas J. Cashman, Philip J. Pratt
8. New Perspectives on Microsoft Office Access 2007, Comprehensive, Joseph J. Adamski, Kathleen T. Finnegan
9. Basic Internet, By O.H.U. Heathcote
10. Microsoft Office 2007 Power Point: A Training Book for Microsoft Power Point 2007, By W. R. Mills

VOC 103 Auto Service Technician (Theory)

(2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Assist senior technician in diagnosing faults in a given motor vehicle
CO2	Perform servicing and minor repairs of a given motor vehicle
CO3	Plan and organize work to meet expected outcomes
CO4	Perform effectively in teams
CO5	Maintain healthy, safe and secure working environment
CO6	Prepare report

Module I: Introduction to Automobile Industry (8 Hours)

Qualifications Pack -Occupational Standards for Automobile Industry by Automotive Skill Development Council (Auto service Technician Corresponding ASC/N 0003)

Module II: Functioning of various components and aggregates of the vehicle (6 Hours)

Qualifications Pack -Occupational Standards for Automobile Industry by Automotive Skill Development Council (Auto service Technician Corresponding ASC/N 1402)

Module III: Assessing service and repair requirements (6 Hours)

Qualifications Pack -Occupational Standards for Automobile Industry by Automotive Skill Development Council (Auto service Technician Corresponding ASC/N 1402)

Module IV: Interaction with Co-workers and Colleagues (6 Hours)

Qualifications Pack -Occupational Standards for Automobile Industry by Automotive Skill Development Council (Auto service Technician Corresponding ASC/N 0002)

Module V: Tutorials, assignments and presentation based on Module I to IV (4 Hours)

References:

- 1)Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill 10th edition.
- 2) Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill.
- 3) Basic Automobile Engineering: C P Nakara: Dhanpatrai publication.

VOC 104 Auto service technician (Practical) (2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Explain various precautions to be taken to avoid damage to the vehicle and its components while working on diagnosis or troubleshooting the vehicle for any faults
CO2	ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary
CO3	identify the auto component manufacturer specifications related to the various components/ aggregates in the vehicle,
CO4	record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure
CO5	Analyze carry out adjustments, replacement of vehicle components and replenishment of consumable materials following the manufacturer's current specification for the particular maintenance interval, working methods and procedures, use of equipment, the tolerances for the vehicle
CO6	Plan for how suspension systems, steering systems, braking systems, non-electrical body systems, wheels and tyres operate for the type of vehicle on which you are working (including regenerative braking systems and other energy recuperation systems used on hybrid / electric and alternative fuel vehicles)

As Per Automotive skill development council Corresponding ASC/N 0003, ASC/N 1402, ASC/N 0002.

VOC 105 Occupational Practice Essentials

(2 Credits: 50 Marks)

Course Outcomes

On completion of the course, students will be able to –

1	Define Inventory Management, quality management, recognize Manufacturing practices, Define of Project, Jobs, Events - Arrow Diagrams - Time Analysis and Derivation of the Critical Path.
2	Explain the effect of demand uncertainty, Risk pooling, A single warehouse inventory example
3	Apply Kaizen, T.P.M., S.M.E.D., 5-S Principles, Housekeeping, Kanban, Poka -Yoke, JIT as tools for better productivity
4	Distinguish centralized versus decentralized systems, plan JIT manufacturing and Lean manufacturing through waste elimination.
5	Test Problem solving tools such as- seven Tools for quality control such as Pareto charts, Check sheets, Cause and effect diagram, Scatter diagrams, Histogram, Graphs or flow charts, Control charts
6	Prepare Shortest Route Problem, develop Project Planning & Control by use of CPM/PERT Concepts

Module 1 - Inventory Management

(8 Hours)

Introduction, A single warehouse inventory example, The economic lot size model, The effect of demand uncertainty, Risk pooling, Centralized versus decentralized systems, Managing inventory in the supply chain.

Module 2 – Manufacturing Tools

(6 Hours)

Total productivity through such practices- Kaizen, T.P.M., S.M.E.D., 5-S Principles, Housekeeping, Kanban, Poka -Yoke, JIT, JIT manufacturing and Lean manufacturing through waste elimination.

Module 3 – Quality Management

(6 Hours)

Introduction and evolution of quality movement, Problem solving tools such as- TQC Tools – problem solving, TQC Tools – Management, Quality Improvement and Total Employee Involvement

Module 4 - Network Analysis

(8 Hours)

Minimal Spanning Tree Problem - Shortest Route Problem, Maximal Flow in Capacitated Network - Concepts and Solution Algorithm as Applied to Problem, Project Planning & Control

by use of CPM/PERT Concepts. Definitions of Project, Jobs, Events - Arrow Diagrams - Time Analysis and Derivation of the Critical Path.

Module V- Presentation's, case studies, Assignments, Tutorials based on Module I to IV (6Hours)

Reference Text:

1. Toyota Production Systems - Taichi Ohno, Kaizen , Masaki Imai
2. Chronicles of a Quality Detective - Dr Shrinivas Gondhalekar, Payal Sheth
3. Beyond T.Q.M - By Robert L. Flood
4. T.Q.M Process - By Gopal Kanji, Mike Asher
5. Operation Research - Taha
6. Quantitative Techniques in Management – N.D.Vohra
7. Quantitative Techniques in Management – J.K.Sharma

Semester – I
Automobile

(Skill Development Components)

Skill Development Components

Automobile

VOC-131: Automobile Technology

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Demonstrate automobile vehicle components (two and four wheeler)
CO2	Differentiate and demonstrate all types of engine components
CO3	Apply knowledge of identify engine and vehicle components.
CO4	Clarify engine and vehicle specifications
CO5	Apply knowledge to for better driving skills and their safeties.
CO6	Identify various electrical equipments used in automobile.

Course Content:

Module I: Introduction to automobile

(6 Hours)

History of automobile, Indian and worlds leading automobile Industries, Introduction to the Components of automobile, Classification of automobile, (Two wheeler and four wheeler) engine, Clutch, gear box, differential, axle, wheel, brake, suspension, steering, electrical components, frame, body etc.

Module II: Engine and its components

(6 Hours)

Construction and working principle of I.C engine, classification of I.C engine, Construction and working of two stroke petrol engine, Construction and working of four stroke petrol engine; Difference between two stroke and four stroke engine; Petrol and diesel engine, Various rule and road signs for safety driving.

Module III: Driving Technique Technical details and vehicle

(6 Hours)

Driving hints, Driving technique Technical details and vehicle specification, engine specifications and driving safety Technical details included in owners and service manual. Work, power, energy, efficiency, bore, stroke, displacement, compression ratio, IHP, BHP.

Module IV: Basic Concept of Electricity

(6 Hours)

Current, Ampere, Volt, Resistance, Ohm law, potential difference, parallel circuit, series circuits Introduction of material. Classification, properties & uses of materials. Basic concept of electricity.

Module V: Tutorials, assignments and presentation based on Module I to IV (6 Hours)

References:

- 1) Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill
10th edition ISBN: 9780070634350.
- 2) Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill.
- 3) Basic Automobile Engineering: C P Nakara: Dhanpatrai publication.
- 4) Automotive Mechanics: S Shrinivasan: Tata McGraw Hill Second edition
- 5) Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributors.
- 6) Automobile engineering Vol-II: Dr. Kripal Singh: Standard Publisher distributors.
- 7) Internal Combustion Engine: V. Ganesan: Tata McGraw Hill Third edition.
- 8) Automobile engineering: R. B. Gupta: SatyaPrakashan
- 9) Automobile Engineering Vol-I: K. M. Gupta: Umesh Publication
- 10) Automobile Engineering Vol-II: K. M. Gupta: Umesh Publication

VOC 132 Automobile Tools and Equipments

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Define tools and equipment used in automobile workshop.
CO2	Describe method of 5 s operation.
CO3	Demonstrate use of measuring and marking tool.
CO4	Selection of proper tools and equipment for prescribed operation.
CO5	Recommend tools and equipment for different automotive application

Module I: Introduction of work shop, General Tools and Equipments:- (6 Hours)

Introduction of work shop, work shop ethics, discipline, safety precaution, elementary first aid, workshop lay out, 5's' techniques. Introduction and use of various tools and equipment used in work shop.

Module II: General and Special Tools (6 Hours)

Hammers, Chisels, Screw drivers, Torque Wrench, Adjustable wrenches, Wheel nut spanners, Punches, Pliers, Files, Spanner, Allen keys, Taps, Hacksaws, Dies, Reamers, Scrapper, Cleaning tools

Module III: Measuring and Marking Tools (6 Hours)

Inside caliper, outside caliper, Vernier caliper (Inside/Outside), Micrometer (Inside/Outside), Height gauge, bore gauge, Compression gauge, Vacuum gauge, Try square, Feeler gauge, Tachometer, AVO meter, Surface plate, Angle plate, Scribing block, Height gauge, Dial indicator, 'V' Block etc.

Module IV: Automotive Equipments (6 Hours)

Mechanical & Hydraulic Jack, Piston ring compressor, Piston ring expander, Stud extractor, Valve spring lifter, Tap extractor, Tyre remover, Wheel balancing Equipment, Brake testing equipment, Pullers, Filter wrench, Battery tester, Growler, Hydrometer spark plug tester, coil and condenser tester, Bench vice, Spray gun, Painting process and Tools etc.

Module V: Tutorials, assignments and presentation based on Module I to IV (6 Hours)

References:

1. Workshop Technology Vol-I: B. S. Raghuwanshi: Dhanpat Rai & Co.
2. Automobile engineering Vol-I: Dr. Kripal Singh: Standard Publisher distributors.
3. Engineering Metrology, R.K. Jain, Khanna Publisher Delhi.
4. Workshop Technology Vol- I, W.A.J. Chapman.

VOC 133 Workshop Technology

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Define Manufacturing Machines used in automobile workshop.
CO2	Describe method of Wheel Alignment machine. Wheel balancer machine.
CO3	Demonstrate use of General Purpose Machine and its Cutting tools.
CO4	Demonstrate use of Special Purpose Machines in manufacturing industry.
CO5	Selection of manufacturing process and Machine for prescribed operation.
CO6	Recommend Machines and equipment for different automotive application.

Module I: Introduction of General machineries (6 Hours)

Introduction, working, Construction and use of machines: - Lathe, Milling, Shaper, Drilling, Grinding, Welding machine (Arc/Gas), Soldering and Brazing, air Compressor, Fly press, Pipe bending Machine, Wheel alignment machine, Wheel balancer Machine, F.I pump testing bench, Tyre changer Machine, Tyre inflection Machine, Decarburizing Machine.

Module II: General Purpose Machines (6 Hours)

Lathe machine, types of Lathe machine, Construction of Lathe, Thread cutting mechanism, Accessories and attachments, Lathe operations, Taper turning, Milling machine, Milling Methods, Types of Milling machine, operations on milling machine

Module III: Special Purpose Machines (6 Hours)

Drilling machine, Construction of drilling machine, Types of drilling machines, operations on drilling machine, Shaper machine, working principle of shaper machine, Types of shaper, operations on shaper machine, Planer machine, Working principle, Types of planer.

Module IV: Metal Joining Methods (6 Hours)

Welding, Electrodes, Gas Welding, Oxy fuel gas welding, MIG, TIG, SAW, SMAW, Thermit welding, Electroslag welding, Types of joints, Riveting, Soldering, Brazing.

Module V: Tutorials, assignments and presentation based on Module I to IV(6 Hours)

References:

- 1) Workshop Technology Vol-I: B. S. Raghuwanshi: DhanpatRai& Co.
- 2) Workshop Technology Vol-II: B. S. Raghuwanshi: DhanpatRai& Co.
- 3) Workshop Technology Vol-I: S. K. Hajra Choudhari. A. K. Hajra Choudhari. NirjharRoy :Media Promoters and Publication Pvt.Ltd.

VOC 134: Engineering Drawing

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Distinguish between isometric drawing and orthographic drawing.
CO2	Adapt the necessary nomenclature, specifications, rules, tools required for Engineering drawing.
CO3	Interpret different types of planes.
CO4	Distinguished between Aligned and unidirectional system of dimensioning.

Module I: Introduction to engineering drawing (6 Hours)

Drawing equipments, instruments and materials, instrument types, specifications, Lines, Lettering and dimensioning, types of lines, Geometric construction, Numerals and Greek alphabets, Dimensioning methods.

Module II: Projections of point, Lines and Planes (6 Hours)

Introduction to projection, Reference planes, orthographic projections, 1st angle and 3rd angle projection and their symbols, projections of point, projections of lines, Projections of planes, Projection of planes parallel to one of the reference planes, Projection of plane inclined to one reference plane and perpendicular to another.

Module III: Orthographic Projections (6 Hours)

Types of projections-orthographic, perspective, isometric and oblique: concept and applications, Methods of projections, Conversion of simple pictorial views into Orthographic views, B.I.S. code of practice.

Module IV: Isometric Projections (6 Hours)

Isometric axis, lines and planes, Isometric scales, Isometric view and isometric drawing, Difference between isometric projection and isometric drawing, isometric view from orthographic views of objects.

Module V: Tutorials, assignments and presentation based on Module I to IV(6 Hours)

References:

1. “Elements of Engineering Drawing” ,N.D. Bhatt, Charotar Publishing House.
2. “Engineering Drawing” ,P.J.Shah, S.Chand, New Delhi.
3. “Fundamentals of Engineering Drawing” ,W.J.Luzzadar, Prentice-hall of India Pvt. Ltd.-New Delhi.
4. “Fundamentals of Drawing” ,K.R.Gopalkrishna, Subhash Publications, Bangalore.
5. “Engineering Drawing” ,M.B.Shah, B.C.Rana, Pearsons.
6. “Fundamentals of Engineering Drawing” ,French & Vierck, McGraw-Hill Publication.

VOC-135: Laboratory Course-I (AU) (Automobile Technology)

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Apply knowledge on differentiating two and four wheeler vehicle
CO2	Identify various engine and vehicle components
CO3	Differentiate various types of engine their working, construction application
CO4	Apply knowledge on road safety and safe driving techniques
CO5	Apply knowledge to identify various automobile dealers, their functions, various activities under dealership

- 1) Demonstration on difference in two wheeler & four wheeler.
- 2) Demonstration of various automobile parts used in Two wheeler, Three wheeler, Four wheeler their basic function, construction & location etc.
- 3) Demonstration of various engine components their function, construction, location, material etc. Sketching of Various engine components.
- 4) Demonstration on working of two strokes and four stroke engine on cut section Model (petrol & diesel engine also used of).
- 5) Demonstration on difference in petrol engine and diesel engine.
- 6) Demonstration on difference in two stroke and four stroke engine.
- 7) Practice on road safety and use of road sings. Draw sketching of various road sings, prepare chart of registration code.
- 8) Practice on driving techniques, importance of safe driving.
- 9) Collection of vehicle information broacher from authorized dealer and prepare chart on technical details.
- 10) Prepare chart of various two and four wheeler dealers available in city - Dealer name, address, contact number, manufacturer details and their various Models.
- 11) Study on service manual on any one automobile vehicle model.
- 12) Study of electrical circuit - parallel and series.
- 13) Practice on using various electrical measuring equipment.
- 14) Visit to automobile garages/ automobile industries.

VOC 136 Lab Course on Automobile Tools and Equipments

(2 credits 50 Marks)

Course Outcomes:

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

CO1	Describe the procedure of using general purpose tools and equipments.
CO2	Practice general safety procedure in Automobile Garages.
CO3	Practice 5 S technique
CO4	Operating special purpose automotive tools and equipments.
CO5	Checking the battery for charging, connecting the battery for charging

1) Practice on health & safety - importance of safety precaution, Shoes, Dressing, safety symbol, safety equipments. (In relation with practical No.8) Practice on how to use first aid & fire extinguishers.

2) Practice on 5.s technique.

3) Demonstration on how to use various tools used in work shop, their free hand sketching.

General tools –

Measuring tools,

Marking tools,

Special tools,

4) Demonstration on how to use various Tools and equipments used in two wheeler garage , Tools and equipments used in four wheeler garage.

5) Practice on checking the battery for charging, connecting the battery for charging

6) Demonstration on painting equipments, coating and polishing.

7) Demonstration of Decarburizing Process, smoke tester, FI pump testing, car washing, hydraulic hoist, air compressor etc.

8) Visit to Garage for usage of Tools & Equipments Used in two, three and four wheeler garage. To Various automobile dealers/ authorized work shop.

-To Automobile Industry/ Automobile components manufacturing industries.

VOC 137 Lab Course on Workshop Technology

(2 credits 50 Marks)

Course Outcomes:

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

CO1	Describe the workshop, work done in workshop
CO2	Demonstrate use of various Machines in Automobile Industries
CO3	Examine General Purpose machines and analyze it.
CO4	Recognize special purpose machine and explain it.
CO5	Design to plan Jobs on Machining operations.

1. Introduction to the work shop, types of work done in work shop, job opportunity
2. Demonstration on various machine used in automobile industries - Compressor, Drilling, Grinding, Welding (Arc & Gas), Hand Operated & Hydraulic Operated Press, lathe, milling, Shaper machine, crank shaft grinding, cylinder boring, cylinder head refacing, honing, Wheel Alignment, Tyre changer, Wheel balancing M/c.
3. Study of General Purpose machines
4. Study of Special Purpose machines
5. Two Jobs on machining operations

VOC 138 Lab Course on Engineering Drawing

(2 credits 50 Marks)

Course Outcomes:

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

CO1	Draft the orthographic view of Mechanical parts.
CO2	Differentiate between types of line used in engineering drawing.
CO3	Draft the isometric view of Mechanical parts.
CO4	Read isometric and orthographic drawing completely.

1. Sheet based on types of lines, types of dimensioning, Numerals and Alphabets.
2. Projections of points and lines (4 problems).
3. Projection of different planes with different conditions(triangle, square / rectangular, pentagonal / hexagonal).
4. Orthographic projections of different objects. (Two problems)
5. Isometric drawings from given orthographic views (Three problems)
6. Introduction to AutoCAD Software.

Semester – II

General Academic Components

Semester II
General Education Components
VOC - 201: Linguistic Proficiency-II

(4 Credits: 100 Marks)

Part - A: English

Course Outcomes:

On completion of the course, students will be able to

1	Write notices, agendas, minutes of meetings in English and Hindi
2	Write applications for jobs, and business related letters in English and Hindi
3	Develop effective listening skills and prepare speeches, proposals and reports in English and Hindi
4	Prepare Surveys, Proposals and Projects reports in English and Hindi

Module –I: Introducing written communication

(10 Hours)

1. Writing Notices
2. Drafting Agendas (Synergy)
3. Writing minutes
4. Note taking
5. Basic of spoken English

Module-II: Writing applications, letters and business Correspondence

(12 Hours)

(Introducing Business Correspondence):

1. Writing applications for various jobs, referring to the ads.
2. Writing letters:
 - a. Letters of inquiry
 - b. Letters of order
 - c. Letters of complaint
 - d. Letters of indent
 - e. Letters of credit
 - f. Bills of lading(Exercises from Synergy) Orient Longman

Module- III: Introducing listening skills

(8 Hours)

1. Approaches to listening skills
2. Barriers to effective listening
3. Tips for effective listening
4. Preparing for interview, Interview facing techniques
5. Preparing -

- a. Speeches
- b. Presentations
- c. Meetings
- d. Surveys
- e. Report writing
- f. Making Project reports
- g. Preparing Proposals
- h. Seeking financial assistance / loan for your proposal

References:

- 1) Synergy: Communication in English and study skills (Orient Blackswan) – (2008)
- 2) Macmillan foundation English – R. K. Dwivedi, A. Kumar: Macmillan India Ltd. 2001
- 3) Mastring Communication – Nicky Stanlon: Palgrave Macmillan (2009)
- 4) Scientists must write – Robert Barrass: Routledge Publication, London
- 5) Functional Grammar and Spoken and Communication in English – Bikram K. Das: Orient Longman Publication (2006)

PART-B: BASIC STRUCTURE OF THE HINDI LANGUAGE

(ON NEXT PAGE.....)

Part-B: Hindi

संप्रेषणमूलक व्यावसायिक हिंदी:

Module- IV:

वाणिज्य व्यवसाय और हिंदी:

- वाणिज्य व्यापार से तात्पर्य एवं व्यावसायिक व्यापार के साधन
- वाणिज्य व्यापार और भाषिक प्रकार्य
- वाणिज्य-व्यावसायिक संरचनात्मक विशेषताएँ
- भाषा कौशल्य:

श्रवण, भाषण, वाचन, लेखन

व्यावसायिक - संप्रेषण:

- संप्रेषण के तात्पर्य एवं स्वरूप
- संप्रेषण के प्रमुख प्रकार: भाषिक तथा भाषेतर
- व्यावसायिक पत्राचार

क) व्यापारिक- व्हावहारिक सामान्यपत्र, आवेदनपत्र, यासाखपत्र, संदर्भ तथा साखपत्र के जाँचपत्र, मुल्य ज्ञापनपत्र, आदेशोके निरसन सम्बंधीपत्र, शिकायतपत्र, समायोजनपत्र, तगादायावसूलीपत्र, विक्रय प्रतिनिधित्व संबंधीपत्र,

ख) विशेष व्यावहारिकपत्र:

- बीमातथाबीमा - पत्र
- रेल तथा जहाज द्वारा माल परिवहन से संबंधितपत्र

ग) प्रकल्प / सर्वेक्षण / प्रात्यक्षिक:

- भाषिक कौशल्य अभ्यास
- वाणिज्य - व्यावसायिके भाषिक प्रकार्या कासर्वेक्षण
- व्यापारिक संप्रेषण - पत्रलेखन का अभ्यास

सहायक ग्रंथ:-

१. व्यावसायिक संप्रेषण: डॉ. अनूपचंद्र मायानी, राजपाल एण्ड संस, नईदिल्ली
२. भाषाशिक्षण:सिध्दांतऔरप्रक्रिया - मनोरमागुप्त, केंद्रियहिंदीसंस्थान, आगरा
- ३.मीडियालेखन: सिध्दांतऔरव्यवहार - डॉ. चंद्रप्रकाश
४. व्यावसायिकहिंदी - डॉ. दिलीपसिंह, वाणीप्रकाशन, काशन, नईदिल्ली.
५. संप्रेषणमूलक व्यावसायिक हिंदी - डॉ. माधवसोनटक्के: ओरियण्ट ब्लैक स्वाईन, दिल्ली.

**VOC – 202: Computer Fundamentals-II
(Basic Computer Hardware System)**

(2 Credits: 50 Marks)

Course Outcomes:

On completion of the course, students will be able to

1	Define and Discuss Basic architecture, hardware aspects, peripherals (memory, input/output devices) of Computers
2	Explain step by step hardware assembly of Computers
3	Compare printer categories, describe printing principles and types of scanners
4	Describe hardware features, maintenance basics and develop wi-fi network related troubleshooting skill with laptops
5	Assemble a desktop computer and install operating system/ softwares , while identifying components in Bios set-up and address problems related to installation

Module-I: Computer Architecture

(6 Hours)

Computer Architecture, Mother Board and its all components, Computer Components (Input/ Output Devices, Primary and Secondary Memory, Power Supply, Monitor).

Observation of all parts of Floppy drives, HDD, CD, and SMPS. Identification of cables and computers. Mounting Motherboard in cabinet, Installation of cards, devices and then connecting cables. Fitting of cabinet. CMOS – Setup, Troubleshooting.

Module-II: Computer Assembling

(6 Hours)

Computer Assembling, Make your own Computer, Operating System Installation, Windows Vista, Software Installation, Trouble Shooting, Bios Setups, Identifications of Components. Advanced Trouble Shooting and Maintenance.

Module-III: Printers and printing mechanism

(6 Hours)

Types of printers and printing mechanism, How printer works, Inject printer, working of laser printer, Fonts/Type faces, Trouble shooting printers. Types of Scanners and its used.

Module-IV Introduction to Laptops

(6 Hours)

Introduction to Laptops, Portable System background, System Features, Processors, Mother Boards, Memory, Power, Expansion Bus, Hard Disk & Removable Storage Devices, Laptop Components, Laptop Maintenance & Assembling, Linux, Multimedia, Internet, Computer VIRUS, Wi-Fi Network Trouble Shooting.

Module V : Tutorials, assignments and presentation based on Module I to IV (6 Hours)

REFERENCES:

- (01) Hardware bible By : Winn L Rosch, Techmedia publications
- (02) Trouble shooting, maintaining and repairing PCs By : Stephon J Bigelow Tata McGraw Hill Publication
- (03) Modern All about printers By :Manohar Lotia, Pradeep Nair, BijalLotia BPB publications.
- (04) The complete PC upgrade and maintenance guide By : Mark Minasi, BPB Publications

VOC – 203: Computer Fundamentals-II (Basic Computer Hardware System)

(2 Credits: 50 Marks)

1. Handling of all Computer Peripherals
2. PC Troubleshooting
3. Windows Installation
4. PC Assembling
5. Fault finding in PC and recovering
6. Installation and use of Printers and Scanners
7. Fault Finding and Troubleshooting on Laptop

Rather than performing a certain prescribed number of experiments, this laboratory coursework is meant for providing sufficient hands on practice of the students with computer. However, for purpose of evaluation, at least six experiments, more or less equally divided from above listed sectors, are to be performed.

VOC 204: Environment Management

(4 Credits: 100 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Discuss Ecosystem and Natural Resources
2	Describe impact of Pollution on human beings and nature
3	Infer role of human being in pollution and waste management
4	Discuss Biodiversity and Relate necessities for conservation of nature
5	Describe issues related to urban environment, sustainability and sustainable development

Module - I: Ecosystems and Natural Resources

(8 Hours)

Introduction: Introduction and scope of environmental science; Need of public awareness.

Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Natural Resources: Land resources and land use change; Land degradation, soil erosion and desertification; Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity; Water: Use and over-exploitation of surface and ground water, floods, droughts; Energy resources: Renewable and non-renewable energy sources, growing energy needs.

Module - II: Environment Pollution, Waste Management and Role of Human being (8 Hours)

Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution, Nuclear hazards and human health risks; Case Studies: Bhopal Tragedy, Chernobyl disaster etc.

Waste management: Control and treatment measures of urban and industrial waste; Trade in Wastes; Industrial Ecology and Recycling Industry Waste trade;

Human population growth: Impacts on environment, human health and welfare. Growth Limits. Resettlement and rehabilitation of project affected persons; case studies.

Disaster management: floods, earthquake, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics

Module -III: Biodiversity and Conservation

(8 Hours)

Levels of biological diversity: Genetic, species and ecosystem diversity; Biogeographic zones of India; India as a mega-biodiversity nation; Endangered and endemic species of India

Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Module- IV: Environment Policies & Practices

(6 Hours)

Fundamentals: Sustainability and sustainable development;

Urban problems: global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture; Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act;

Environment Management System: EMS Standards, ISO 19011 & ISO 14000 Series, Bharat-II and EURO- II, Eco-Audit Scheme, Clearance/ Permission for establishing Industry

Module - V : Tutorials, assignments and presentation based on Module I to IV (6 Hours)

References:

1. Subramanian.V., —The Factories Act 1948 with Tamilnadu factories rules 1950, Madras Book Agency, 21st ed., Chennai, 2000.
2. C.RayAsfahl— Industrial Safety and Health management Pearson Prentice Hall,2003.
3. National Safety Council, —Accident Prevention Manual for Industrial Operations, N. S. C. Chicago, 1988.
4. Heinrich H.W. —Industrial Accident Prevention, McGraw-Hill Company, New York, 1980.
5. Krishnan N.V. —Safety Management in Industry, Jaico Publishing House, Bombay, 1997.
6. John Ridley, —Safety at Work, Butterworth & Co., London, 1983.
7. Blake R.B., —Industrial Safety, Prentice Hall, Inc., New Jersey, 1973
8. Bharucha, E. 2003, Textbook for Environmental Studies, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environmental Education and Research, Pune. 361.
9. Carson, Rachel. 1962. *Silent Spring* (Boston: Houghton Mifflin, 1962), Mariner Books, 2002
10. Economy, Elizabeth. 2010. *The River Runs Black: The Environmental Challenge to China's Future*.
11. Gadgil, M. & Ramachandra, G. 1993. *This fissured land: an ecological history of India*. Univ of California Press.
12. Gleeson, B. and Low, N. (eds.) 1999. *Global Ethics and Environment*, London, Routledge.
13. Grumbine, R. Edward, and Pandit, M.K. Threats from India's Himalaya dams. *Science* 339.6115 (2013): 36-37.
14. Heywood V.H. & Watson, R.T. 1995. *Global Biodiversity Assessment*. Cambridge University Press.
15. McCully, P. 1996. *Silenced rivers: the ecology and politics of large dams*. Zed Books.
16. McNeill, John R. 2000. *Something New Under the Sun: An Environmental History of the Twentieth Century*.
17. Odum, E.P., Odum, H.T. & Andrews, J. 1971. *Fundamentals of Ecology*. Philadelphia: Saunders.
18. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. *Environmental and Pollution Science*. Academic press, 2011.

Semester – II

Automobile

(Skill Development Components)

Skill Development Components

VOC-231 Engine System

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Describe engine and its classification, various systems provided on engine, performance parameters.
CO2	Define ignition system its type, advance technology used on it, and identify various components.
CO3	Define cooling system its type, advance technology used on it, and identify various components.
CO4	Define lubrication system its type, advance technology use on it, and identify various components.

Module – I : Engine and various types of Engine (6 Hours)

Introduction to engine, Heat Engine, Classification of Engine; with respect to cylinder arrangements; with respect to ignition; with respect to method of charging, Engine components and nomenclature, Valve timing for four stroke engine, Engine performance parameters.

Module – II : Ignition System (6 Hours)

Introduction, Requirements of an Ignition system, Battery Ignition system; Battery, Ignition switch, Ballast resistor, Ignition coil, Contact breaker, Capacitor, distributor, spark plug, Operation of battery ignition system; Limitations, Magneto ignition system, Modern ignition systems, firing order, spark advance mechanism, Ignition timing.

Module – III : Cooling System (6 Hours)

Need for cooling system, Characteristics of efficient cooling system, types of cooling systems, Thermosyphon system, Pump cooling, Water pump, Radiator, Air cooled system, Comparison of Air cooled and Liquid cooled system, advantages and limitations.

Module – IV : Lubrication System (6 Hours)

Introduction, Need for Lubrication, significance of Lubrication, Pumping loss, Blowby losses, Mechanism of Lubrication, Lubrication of engine components, Types of lubrication system, Mist lubrication, Wet sump lubrication, dry sump lubrication, types of lubricants and their properties, Crankcase dilution, SAE Rating of Lubricants.

Module V: Tutorials, assignments and presentation based on Module I to IV (6 Hours)

References:

- 1) Automotive Mechanics: William H. Crouse. Donald L. Anglin: Tata McGraw Hill
10th edition ISBN: 9780070634350.
- 2) Automotive Electrical Equipment: P L Kolhi: Tata McGraw Hill ISBN 10:0074602160.
- 3) Basic Automobile Engineering: C P Nakara: Dhanpatrai publication ISBN-10:9352160983.
- 4) Automotive Mechanics: S Shrinivasan: Tata McGraw Hill Second edition ISBN10
8187433221.
- 5) Automobile engineering Vol-II: Dr. Kripal Singh: Standard Publisher distributors ISBN-
10: 8180141969.
- 6) Internal Combustion Engine: V. Ganesan: Tata McGraw Hill Fourth edition, ISBN:
9781259006197.
- 7) Automobile engineering: R. B. Gupta: SatyaPrakashan
- 8) Internal Combustion Engines: Shyam K. Agrawal, New Age International Publishers.

VOC 232 Engineering Materials

(02 credits – 50 marks)

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

CO1	Aware of engineering materials used in automobile systems.
CO2	Explain properties of engineering materials.
CO3	Explain ferrous materials and their alloys.
CO4	Explain non-ferrous materials and their alloys.
CO5	Explain Composites and Non Metallic Materials.

Module-I: Classification and Properties of Material

(6 Hours)

Introduction, Classification of Materials, Mechanical properties of metals – Strength, Elasticity, Stress, Strain, Plasticity, Malleability, Ductility, Toughness, Hardness, Brittleness, Resilience, Creep, Fatigue, Tensile test, Rockwell Hardness test, Brinell Hardness Test, Bend Test.

Module-II: Ferrous Metal and their Alloys

(6 Hours)

Cast iron, Types of cast irons, properties, structures, compositions and applications, plain carbon steels, low alloy steels and effects of alloying elements like Nickel, Silicon, Chromium, Tungsten, and Molybdenum on the properties of steel, high alloy steels, stainless steel types, heat resistance steels, Shock resistance steel and their composition, application, Designation of cast iron and steel, Heat treatment- Annealing, Quenching, Normalizing, Tempering.

Module-III: Non Ferrous Metals and their Alloys

(6 Hours)

Copper Alloys: Brasses – Muntz metal, Cartridge brass, Admiralty brass, Naval Brass, Bronzes – Gun Metal, Phosphor Bronze, Aluminium Bronze, Copper-Nickels alloys. Bearing metals- Babbitt, Copper lead alloys, Bronze bearing alloys. Light metal alloys: Aluminium alloys- Duralumin, Cast Aluminium alloys, Aluminium Silicon Alloys. Sintered Carbide., properties, applications

Module-IV: Composites and Non Metallic Materials

(6 Hours)

Types of composites, plastics, Ceramics, abrasives, polymers: thermosetting and thermoplastics, Fibre, rubber and their properties and application, Smart materials, Composite materials.

Module - V: Tutorials, assignments and presentation based on Module I to IV. (6 Hours)

References:

1. V.D.Kodgire, S.V.Kodgire “Material Science and Metallurgy for Engineers”
2. Swarup D. and Saxena M.N., "Elements of Metallurgy", Rastogi Publishers, Meerut, 1994
3. Daniel Yesudian C., “Materials Science and Metallurgy”, Scitech Publications (India), 2004.
4. Srinivasan N.K. and Ramakrishnan S.S., "The Science of Engineering Materials", Oxford and IBH Pub. Co., New Delhi, 1993
5. Guy A.G," Elements of Physical Metallurgy", Oxford & IBH Pub. Co., 1990

VOC - 233 Manufacturing Processes

(2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Explain Manufacturing processes required to manufacture different parts of automobile.
CO2	Explain Metal Casting process.
CO3	Explain Forging and Rolling Processes.
CO4	Explain Extrusion and Drawing Process.
CO5	Explain Powder Metallurgy Process.
CO6	Prepare Presentations

Course Content:

Module-I: Metal Casting

(6 Hours)

Introduction to Foundry - Steps involved in casting, advantages, limitations and applications of casting process. Pattern types, allowances for pattern, pattern materials, color coding and storing of patterns, Sand castings, pressure die casting, permanent mould casting, centrifugal casting, precision investment casting, shell Moulding, CO₂ Moulding, continuous casting-squeeze casting, Fettling and finishing, defects in Castings.

Module-II: Forging and Rolling Processes

(6 Hours)

Forging principle, classification, equipment, tooling-processes, parameters ,defects (cause and remedy) & application; Principles of rolling processes, classification, types of rolling mills, rolling mill control, effects of friction. Form rolling, rolling defects, causes and remedies

Module-III: Extrusion and Drawing Processes

(6 Hours)

Classification of extrusion processes-tool, equipment, Hot working, cold working, principle of extrusion and drawing processes, influence on friction, defects, wire drawing-tool, equipment, defects(cause and remedy) & application -Tube drawing and sinking processes.

Module-IV: Powder Metallurgy

(6 Hours)

Introduction to Powder Metallurgy process, preparation of powders, types & function of binders, green compaction, sintering process and its effect on the product, application of powder metallurgy products, advantages of powder metallurgy products, Sintering equipment.

Module - V: Tutorials, assignments and presentation based on Module I to IV. (6 Hours)

References:

1. Production Technology: R.K.Jain, Khanna Publishers.
2. Manufacturing Technology: Vol I, P.N.Rao, Tata McGraw Hill.
3. Manufacturing Technology: R.K. Rajput, Laxmi Publications.
4. Welding and Welding Technology: Richard L.Little, Tata McGraw Hill.
5. Principle of Metal casting- Rosenthal, Tata McGraw Hill.
6. Manufacturing Processes and Systems: Ostwald Phillip F., Munoz Jairo, John Wiley & Sons (Asia) Pvt. Ltd.

VOC 234 Engineering Drawing II

(2 credits 50 Marks)

Course Outcomes:

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

CO1	Distinguish between developed and undeveloped view of drawing.
CO2	Interpret the sections of solids such as prism and pyramid.
CO3	Interpret sectional orthographic view of Mechanical parts.
CO4	Design and development of lateral surfaces for industry applications.

Course Content:

Module – I Projections of Solids

(6 Hours)

Introduction, Type of solids, Projections of solids in simple position, Projection of solids with axes inclined to one of the reference planes and parallel to the other, Projections of solids with axes inclined to both H.P. and the V.P

Module – II Sections of Solids

(6 Hours)

Introduction, projection of sectional view, Types of section plane, Section plane perpendicular to V.P. and parallel to H.P., Section plane perpendicular to H.P. and parallel to V.P., Section plane perpendicular to V.P. and inclined to H.P., Section plane perpendicular to H.P. and inclined to V.P., Section plane perpendicular to both H.P. and V.P.

Module – III Sectional Orthographic Projections

(6 Hours)

Introduction, Cutting plane line, types of sectional view, Different types of Holes, problem on sectional orthographic projections.

Module – IV Development of Surfaces

(6 Hours)

Introduction, Application of Development of surfaces in engineering products, Methods of development: Parallel line method, Radial line method, Development of prism, cylinder, pyramid and Cone.

Module - V: Tutorials, assignments and presentation based on Module I to IV. (6 Hours)

References:

1. "Elements of Engineering Drawing" , N.D. Bhatt, Charotar Publishing House.
2. "Engineering Drawing" , P.J.Shah, S.Chand, New Delhi.
3. "Fundamentals of Engineering Drawing" , W.J.Luzzadar, Prentice-hall of India Pvt. Ltd.-
New Delhi.
4. "Fundamentals of Drawing" , K.R.Gopalkrishna, Subhash Publications, Bangalore.
5. "Engineering Drawing" , M.B.Shah, B.C.Rana, Pearsons.

VOC-235: Laboratory Course-V (AU) (Engine System)

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Demonstrate how two stroke, four stroke engine disassemble and assemble
CO2	Demonstrate how conventional ignition and advance ignition system work and identify faults.
CO3	Demonstrate how cooling system works, locate the components and identify faults.
CO4	Demonstrate how lubrication system works, locate the components and identify faults.
CO5	Apply knowledge to replace of oil, repairing of alternator.

1. Assembly and Disassembly of 2 Stroke petrol Engine
2. Assembly and Disassembly of 4 Stroke diesel Engine
3. Demonstration of Battery Ignition System
4. Demonstration of Electronic Ignition System
5. Demonstration of Cooling system used in 4 wheeler
6. Demonstration of Lubrication System used in 2 wheeler
7. Assembly and Disassembly of Alternator
8. Overhauling of Crank case; Oil filling and replacing.

VOC 236 Two wheeler servicing

(2 credits 50 Marks)

Course Outcomes:

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

CO1	Perform Assembly and disassembly of Multi plate Clutch.
CO2	Perform Assembly and Disassembly of Constant mesh gear box.
CO3	Perform Overhauling of gearbox; replacing gear oil, 4 stroke Engine; replacing engine oil.
CO4	Explain various components of Telescopic shock Absorber.

Course Content:

1. Cleaning and Washing of vehicle by using jet washer kit.
2. Assembly and disassembly of Multi plate Clutch.
3. Demonstration of Carburetor used in 2 Wheeler.
4. Assembly and Disassembly of Constant mesh gear box.
5. Overhauling of gearbox; replacing gear oil.

6. Overhauling of 4 stroke Engine; replacing engine oil.
7. Demonstration of Telescopic Shock Absorber.
8. Overhauling of Brake system used in 2 Wheeler.

VOC-237: Laboratory Course-VII (AU) (Workshop Practice)

(2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Perform Lap welding joint.
CO2	Perform Step turning and Taper Turning operation on lathe machine
CO3	Perform fitting shop ('V' Fitting)
CO4	Perform Butt welding joint.

Course Content:

1. Job on lap welding joint (50 mm x 50 mm)
2. Job on Step turning and Taper Turning operation on lathe machine
3. Job on fitting shop ('V' Fitting)
4. Job on butt welding joint.

VOC 238 Lab course based on Engineering Drawing II

Course Outcomes:

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

CO1	Draw the orthographic projections of regular solids.
CO2	Analyze the sections of solids such as prism and pyramid.
CO3	Draft sectional orthographic view of Mechanical parts.
CO4	Draft development of lateral surfaces for industry applications.

1. Sheet based on Projections of Solids.(4 problems)
2. Sheet based on Sectional Orthographic view (2 problems).
3. Sheet based on Development o Surfaces (2 problems)
4. Sheet based on section of solids. (2 problems)
5. Drawing based on Autocad Software.

Semester – III

General Academic Components

Semester III

General Education Components

VOC: 301: Linguistic Proficiency - III

(4 credits 100 Marks)

Course Outcomes

On completion of the course, students will be able to –

1	Explain and classify various types of presentation skills
2	Apply advanced concepts of grammar to formulate correct sentences and paragraphs
3	Classify various forms of written communication
4	Develop ideas and logics for effective correspondence techniques
5	Prepare scripts for comparing / conducting programme

Module- I: (1) Presentation skills:

(8 Hours)

- (a) Oral Presentation
- (b) Group Discussion/Panel Discussion
- (c) Speech/Lecture
- (d) Visual Presentation
- (e) Use of Internet
- (f) Seminar Presentation
- (g) Commentary/ Reporting
- (h) Language of Present functions
- (i) Ability to answer & questions
- (j) Exercise

Module- II: (2) Grammar in Use:

(8 Hours)

- (a) Sentence Structure
- (b) Verbs-Classifications
- (c) Infinitive and gerunds
- (d) Passivity
- (e) Conditionals
- (f) Concord
- (g) Recapitulation of grammatical items
- (h) Exercises

Module- III : Written Communication Skill:

(8 Hours)

- (a) Forms of written communication
- (b) Developing ideas and logic
- (c) Correspondence Techniques
- (d) Writing paragraph and complete item.
- (e) Exercises

- (f) Writing in different forms proposals surveys, appraisals and Reports
- (g) Language and grammar required
- (h) Writing article/paper/news paper/media report
- (i) Exercises

Module- IV: Comparing/Conducting Programmes:

(8 Hours)

- (a) Positive Attitude
- (b) Language /Body Language
- (c) Humour
- (d) Mastering the terminology
- (e) Exercises

Module- V : Tutorials, assignments and presentation based on Module I to IV(8 Hours)

VOC 302: Business Software Tools- I: Web Page Design

(4 credits 100 Marks)

Course Outcomes

On completion of the course, students will be able to

1	Define and Discuss Basic architecture, hardware aspects, peripherals (memory, input/output devices) of Computers
2	Explain step by step hardware assembly of Computers
3	Compare printer categories, describe printing principles and types of scanners
4	Describe hardware features, maintenance basics and develop wi-fi network related troubleshooting skill with laptops
5	Assemble a desktop computer and install operating system/ softwares , while identifying components in Bios set-up and address problems related to installation

Module- I:

(8 Hours)

- A. Introduction-The World Wide Web (WWW), HTML History, Hypertext and Hypertext Markup Language, Microsoft Front Page
- B. HTML Documents- Dividing the document into 2 parts, Headers, Body; Tags-Format, Representing 2 types of tag (odd and even); Elements of an HTML Document -Text Elements, Tag Elements, Special Character elements
- C. Structural elements of HTML documents- Header tags; Body tags- Paragraphs, Titles, Lists (Numbered lists, Non-Numbered lists, Definition lists)
- D. Formatting HTML Documents- Logical styles (source code, text enhancements, variables), Physical Styles (Bold, Italic, underlined, crossed)

Module- II:

(8 Hours)

- A. Managing images in html- Image format (quality, size, type, ...), Importing images (scanners), Tags used to insert images, Frames
- B. Tables in HTML documents- Tags used in table definition, Tags used for border thickness Tags used for cell spacing, Tags used for table size, Dividing table with lines, Dividing lines with cells; Cell types- Titles cells, Data cells

Module- III:

(8 Hours)

- A. Hypertext and Link in HTML Documents- URL/FTP/HTTP; Types of links-Internal Links, External Links, Link Tags, Links with images and buttons, Links that send email messages
- B. Special effects in HTML documents- Text fonts, Sensitive Images, Tip tables; Page background- Variable, Fixed; Rotating messages (Marquee); Counters

Module- IV:**(8 Hours)**

- A. Multimedia- Audio files and acceptable formats (*AIFF, AU, MIDI, WAVE*), Inserting audio files; Video files and acceptable formats (*MPEG, Quick Time, Video for Windows*)- Inserting video files, Screen control attributes (*WIDTH, HEIGHT, ALIGN*), Start control sttributes (*START, FILEOPEN, LOOP, LOOPDELAY, MOUSEOVER*).
- B. Managing forms- Interactive forms; Creating data entry forms; Calling JavaScripts for modifying entered data; JavaScript Primer; Handling Form Output with JavaScript; Filling out HTML forms

Module- V: Tutorials, assignments and presentation based on Module I to IV(8 Hours)**References:**

- Special Edition Using Intranet HTML** / *Mark Surfas, Mark Brown and John Juge*
- Dynamic HTML Web Magic** / *JefDouyer – Hayden development group*
- HTML 4 for the World Wide Web** / *Elizabeth Castro*
- Writing HTML Tutorial by Maricopa Center for Learning and Instruction (MCLI)
- <http://www.w3schools.com/html/>

VOC 303: Statistical Tools: Probability and Statistics

(4 credits 100 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Define and explain concepts regarding random variables
2	Classify types of data, Represent data in diagrammatic/graphical mode
3	Explain ogives and normal distribution
4	Discuss basic concepts, advantages, disadvantages , limitations of Operational Research,
5	Explain Linear Programming problems, Transportation problems, Assignment Problems and sequencing problems

Module- I: Probability and Random Variable

(8 Hours)

Probability – Random variables – Moments – Moment generating function – Standard distributions – Functions of random variables – Two-dimensional R.Vs – Correlation and Regression.

Module- II: Statistics

(8 Hours)

Collection of data, types of data, Classification and tabulation of data, Diagrammatic/ graphical representation of data, Measures of central Tendency for ungrouped data, Mean, median ,mode of ungrouped data, Brief revision of Tabulation of data, inclusive and exclusive type of tables, Histograms, frequency polygon, frequency curve, pie diagram, Ogives(Cumulative frequency graphs) Applications of ogives in determination of median, Relation between measures of central tendency, Introduction tonormal distribution, Properties of normal distribution.

Module- III: Introduction of Operation Research (OR),

(8 Hours)

Origin and Development of OR, Scientific Method in OR, advantages and limitation of OR, Application of OR

Module- IV :Linear programming problems (LLP),

(8 Hours)

Graphical methods, Simplex method, Transportation problem (TP), Assignment problem (AP).Sequencing Problem (SP), Game theory, Networking Scheduling by PERT/ CPM, Replacement Problem

Module- V : Tutorials, assignments and presentation based on Module I to IV

References:

1. Richard Scheaffer, Madhuri Mulekar, James McClave, —Probability and Statistics for Engineers, Cengage Learning, USA, 2010.
2. Gupta, S.C. and Kapur, V.K." Fundamentals of Mathematical Statistics ", Sultan Chand and Sons, New Delhi, 2011.
3. Freund John, E. and Miller, Irwin, "Probability and Statistics for Engineering —, Prentice Hall, 5th Edition, 1994.
4. Jay, L. Devore, "Probability and Statistics for Engineering and Sciences", Brooks/Cole Publishing Company Monterey, California, 1982.
5. Montgomery D.C and Johnson, L.A.," Forecasting and Time Series ", McGraw-Hill. 2005.
6. Anderson, O.D., " Time Series Analysis: Theory and practice ", I. North - Holland, Amsterdam, 1982.
7. Operation Research- K. Swarup, P. L. Gupta, M. Mohan; Sultan Chand & Son
8. Operation Research- Gupta & Kapur; Sultan Chand & Son
9. Operation Research- K. Swarup, P. L. Gupta ; Sultan Chand & Son

Semester – III

Automobile

(Skill Development Components)

Skill Development Components

Automobile

VOC 331 Machine Drawing

(02 credits – 50 marks)

Course Outcomes:

On completion of the course, students will be able to –

CO1	Explain the Machine drawing and its conventions.
CO2	Explain Applications of screw and Fasteners.
CO3	Draw detail and assembly drawing of machine components

Course Content:

Module - I: Conventions in Machine Drawing

05 Hours

Introduction to machine drawing, Standards used in machine drawing, conventional representation of machine components and materials, method of designating and dimensioning metric thread, internal thread, external thread.

Module - II: Screw and Fasteners

07 Hours

Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, Riveted joints, locking arrangement of nuts, screws, washers, foundation bolt setc., keys, types of keys, knuckle joint.

Module - III: Limits, fits and tolerances

08 Hours

Limits, Types of tolerances and fits, hole basis and shaft basis of fits, and geometric dimensioning and tolerance, surface texture, indication of surface roughness, methods of placing machining symbols on orthographic views, Representation of geometrical and dimensional tolerance

Module - IV: Part and Assembly Drawing

04 Hours

Introduction to assembly drawing, steps in making of assembly drawing, assembly drawing of footstep bearing, Knuckle joint, Flange coupling, Flexible coupling, part drawing of Piston, connecting rod, cross head, crank

Module –V Tutorials, case studies and presentation based on Module I to IV 06 Hours

References:

1. Textbook of Machine Drawing, K C John, PHI publisher (2009) ISBN: 8120337212
2. Machine Drawing, by N. Siddeshwar, P. Kannaiah, VVS Shastry, Tata McGraw Hill
3. Fundamentals of Machine Drawing, Dr Sadhu Singh & P L Shah, Prantice Hall India
4. Machine Drawing-K.L. Narayana, P. Kannaiah, KV Reddy-New Age
5. Machine drawing- N.D.Bhatt., published by R.C. Patel Charotar Book Stall Tulshi Sadan, StationRoad, Annad, India.
6. Machine drawing – P.S. Gill S.K. Kataria & Sons Delhi. ISBN: 9789350144169
7. Machine drawing – T.Jones.ISBN : 8170965969
8. Machine Drawing and Computer Graphics by Farazdak Haideri, Nirali Publication, fourth Edition, 2007

VOC 332 Thermodynamics

(02 credits – 50 marks)

Course Outcomes:

On completion of the course, students will be able to –

CO1	Explain the concept of various thermodynamic cycles and their applications
CO2	Explain Steam generators and their performance evaluation
CO3	Explain Types of fuels and the process of combustion

Course Content:

Module - I: First Law Of Thermodynamics

05 Hours

System, thermodynamic equilibrium, state, thermodynamic property, process, cycle, zeroth law of thermodynamics, energy, work, heat, first law of thermodynamics, ideal gases, application of first law of thermodynamics to closed and open systems, pressure-volume diagrams, steady flow process, application of steady flow energy equation.

Module - II: Second Law Of Thermodynamics

05 Hours

Limitations of first law, statements of second law of thermodynamics, heat engine, heat pump, refrigerator, Carnot cycle, Carnot theorem, entropy, temperature–entropy diagram, entropy changes for a closed system.

Module - III: Thermodynamic Cycles

07 Hours

Basic Thermodynamic cycles, Air standard cycle, Rankine cycle, Carnot cycle, reversed Carnot cycle, T-S, P-H diagrams.

Module - IV: Fundamentals of Heat Transfer

07 Hours

Modes of heat transfer, Fourier's law of conduction, one dimensional steady state conduction through plane and composite walls, cylinders and spheres. Heat transfer coefficient, simple problems in fins, heat exchangers, Stefan Boltzmann law, Black body and Grey body radiation

Module –V Tutorials, case studies and presentation based on Module I to IV

06 Hours

References:

1. R. K. Rajput – “A Textbook of Engineering thermodynamics”- Laxmi Publications (P) Ltd, New Delhi (2001).
2. Heat Transfer Principles and Applications, Biray K. Dutta, Printice hall of India, New Delhi (2003).
3. Thermal Engineering, R. Rudramoorthy, Tata McGraw Publishing Co. Ltd, New-Delhi(2003).
4. Engineering Thermodynamics, P. K. Nag, Tata McGraw Hill. (2005)
5. A textbook of Thermal Engineering, R. S. Khurmi, J. K. Gupta, S.Chand & company Ltd (2003)
6. Fundamentals of Engineering thermodynamics, E. Ratha Krishnan, Eastern Economy Edition-Prentice Hall of India Private Limited, New Delhi, (2000).
7. Thermodynamics: An Engineering approach, Yunus A. Cengel, Michael A. Boles, Third Edition(2002).
8. Heat transfer, Y. V. C. Rao, University press, Hyderabad (2001).

VOC 333 Automotive Petrol Engines

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Apply knowledge for identify petrol engine parts, construction and working of petrol engine.
CO2	Demonstrate of various combustion chambers and combustion process of petrol engine.
CO3	Identify different problems occurred due to in complete combustion of fuel.
CO4	Describe methods of fuel supply system, its components, their functions.
CO5	Describe the various advance system used on petrol engine to increase performance.

Course Content:

Module - I: S.I. Engine Construction and Operation

05 Hours

Constructional details of four stroke petrol engine, working principle, air standard Otto cycle, actual indicator diagram, two stroke engine construction and operation, comparison of four stroke and two stroke engine operation, firing order and its significance. Port Timing, Valve Timing of petrol engines

Module - II: Combustion and Combustion Chambers

07 Hours

Gasoline fuels and its properties, Combustion in SI engine; stages of combustion, flame propagation, rate of pressure rise, abnormal combustion, detonation, effect of engine variables on knock, knock rating. Combustion chambers; different types, factors controlling combustion chamber design

Module - III: SI Engine Fuel System

07 Hours

Carburetor working principle, requirements of an automotive carburetor, starting, idling, acceleration and normal circuits of carburetors, Compensation, maximum power devices, constant choke and constant vacuum carburetors, fuel feed systems; mechanical and electrical fuel feed pumps.

Module - IV: Advance S.I. Engine Techniques

05 Hours

Petrol injection system, MPFI system, Construction and working of TBI and PFI systems, Methods of fuel Injection: Sequential, Continuous, grouped, simultaneous injection,

Comparison of carbureted engine fuel supply system with TBI and MPFI System, Sensors and Actuators, ECU, Electronic ignition systems, Variable Valve Timing

Module –V Tutorials, case studies and presentation based on Module I to IV 06 Hours

References:

1. Internal Combustion Engines, Ganesan.V, Tata McGraw Hill Publishing Co., New York, 4th Edition (2012), *ISBN-0-07-049457-6*.
2. A Course in Internal Combustion engine, Mathur-Sharma, DhanpatRai Publication (2010), ISBN-10: 8189928465, ISBN-13: 978-8189928469
3. Internal Combustion Engines, K.K. Ramalingam, SCITECH, 2nd edition (2011), *ISBN10: 8183711022 / ISBN 13: 9788183711029*
4. High Speed Combustion Engines, Heldt.P.M, Oxford Publishing Co., New York, (1990).
5. Automotive Engines, [William H. Crouse](#)(Author), [Donald Anglin](#)(Author), [Donald L. Anglin](#), McGraw-Hill Education (ISE Editions); (1994), ISBN-10: 0071138846, ISBN-13: 978-0071138840.
6. Internal Combustion Engine Fundamental, John B. Heywood., McGraw-Hill, 1988.
7. Engineering Fundamentals of the Internal Combustion Engines, Pulkrabek, Practice Hall of India, 2003.
8. Automotive Engines, Ellinger.H.E, Prentice Hall Publishers (1992).
9. Advanced Engine Technology, Heinz Heister, SAE, 1995.

VOC 335 Laboratory Coursework based on Machine Drawing

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Explain Representation of Machine components and conventions.
CO2	Explain Representation of Fits, geometric tolerance and surface roughness on machine part.
CO3	Draw Assembly and Detail drawing of Piston- connecting rod, Knuckle joint, Rigid and Flexible Flange coupling.

Course Content:

List of Practical's: (Any 05 Practical can be performed)

1. Representation of Machine components and conventions.
2. Drawing of Screw, nut, bolt, fasteners and locking arrangements.
3. Representation of Fits, geometric tolerance and surface roughness on machine part.
4. Assembly and Detail drawing of Piston- connecting rod.
5. Assembly and Detail drawing of Knuckle joint.
6. Assembly and Detail drawing of Rigid and Flexible Flange coupling
7. Assembly and Detail drawing of Cotter joint.
8. Assembly drawing of Single plate Clutch.

VOC 336 Lab. Automotive petrol engine (AU)

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Examine Engine Construction and Operation: Constructional details of 4-stroke petrol engine. Working principle, Otto cycle and actual indicator diagram. Two stroke engine construction and operation
CO2	Describe four stroke and two-stroke engine operation. Firing order and its significance. SI Engine Fuel System: Carburettor working principle. Requirements of an automotive carburettor; Starting, idling, acceleration and normal circuits of carburettors, compensation, Maximum power devices, constant choke and constant vacuum carburettors. Fuel feed systems, Mechanical and electrical pumps. Petrol injection
CO3	Classify Cooling and Lubrication System: Need for cooling system. Types of cooling system, Liquid cooled system, Thermosyphon system, Pressure cooling system.

	Lubrication system, Mist lubrication system, Wet sump and dry sump lubrication. Properties of lubricants. Properties of coolants.
CO4	Distinguish between two stroke and four stroke petrol engine.
CO5	Summaries Combustion and Combustion Chambers: Combustion in SI engines, stages of combustion, Calculate Friction power, Brake power, Indicated power, etc.
CO6	Rearrange Heat Balance sheet for Multi-cylinder Petrol Engine, Multi-cylinder Petrol Engine, Electric Fuel Pump.

1. Dismantling of Multi-cylinder Petrol Engine
2. Demonstration of MPFI system.
3. Demonstration and Calibration of Electric Fuel Pump.
4. Draw Valve Timing Diagram for Petrol Engine.
5. Injector cleaning and Testing.
6. Spark plug cleaning and Testing.
7. Engine Decarburizing.
8. Trial on Multi-cylinder Petrol Engine (Mores Test).
9. Heat Balance sheet for Multi-cylinder Petrol Engine.

VOC 337 Laboratory Coursework based on Automotive Diesel Engines

(02 credits – 50 marks)

List of Practical's:

1. Dismantling of Multi-cylinder Diesel Engine.
2. Demonstration of CRDI system.
3. Demonstration of Turbocharger and EGR system.
4. Draw Valve Timing Diagram for Diesel Engine.
5. Injector cleaning and Testing.
6. Engine Decarbonising.
7. Trial on Single cylinder Diesel Engine (Willians Line Test to calculate frictional power).
8. Heat Balance sheet for Multi-cylinder Diesel Engine.
9. Trial on willians line method to calculate frictional power.

VOC 338 Two wheeler Overhauling

Course Outcomes:

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

CO1	Perform Overhauling of clutch, 4 stroke engine, Two Wheeler gear box, Suspension system.
CO2	Perform replacement of two wheeler wheel bearings.
CO3	Perform carburetor tuning and emission testing.

1. Overhauling of Clutch.
2. Overhauling of 4-stroke Engine.
3. Overhauling of Two Wheeler gear box.
4. Overhauling of suspension system.
5. Replacement of wheel bearings.
6. Overhauling of Braking system.
7. Carburetor Tuning and Emission testing.
8. Demonstration of Two Wheeler Electric System.

Semester – IV

General Academic Components

Semester IV

General Academic Component

VOC 401: Industrial Ethics and Safety Management

(4 credits 100 Marks)

Course Outcomes

On completion of the course, students will be able to –

1	Define Ethics and Industrial Ethics, Moral Values, OHSAS-18001 Standard and OSHA
2	Differentiate between ethics, morality and etiquette, explain ethics at workplace, profession, leadership, Unethical Behavior, discuss Significance of Industrial Safety, Select Safety Instruments, Safety standards, discuss objectives of material Handling, Principles of material handling, Classification of hazards (Safety Hazard and Health Hazard),
3	Explain Experiment measures to ensure Industrial Safety, safety measures, demonstrate storage and Handling of Material and Equipment
4	State Safety Responsibility, prioritize Hazardous Industrial zones, analyze Industrial Safety and risk management
5	Interpret Measure safety inspection procedures (Safety audit, Safety survey, Safety survey, evaluate Possible consequences of security incidents,
6	Express Fire Extinguishers and its types

Course Contents:

Module I- Introduction to Industrial Ethics

(8 Hours)

Industrial ethics, ethical issues in engineering practices(Legal, organizational, Individual), Importance of ethics and moral standards, religion and ethics, social and ethical responsibilities, moral dilemmas, profession, ethics at workplace, values, business ethics, ethical theories, spirituality, and leadership; Unethical behavior.

Module II- Introduction to Industrial Safety

(8 Hours)

Overview of Industrial Safety Management , Need for Safety, Safety standards, Safety, Health and Environment Management Systems, Occupational Health and Safety Management Systems as per OHSAS-18001 Standard and OSHA ,Security Management of Industrial Plants ,Organization, Administration and Management Responsibility in the Field of Safety, Legal Aspects of Safety, Safe Working Practices ,Personal Protective Equipment and Protective Costumes, Storage and Handling of Material and Equipment, Safety in Transportation and Automotive Equipments, Electrical Safety, Electrical Shocks and Their Prevention

Module III- Industrial Hazards

(8 Hours)

Mechanical Hazards, Chemical Hazards, Environmental Hazards, Radiation Hazards, Industrial noise, occupational damage, sound measuring instruments, noise networks, noise surveys, risk factors, non-ionizing radiations, effects, radar hazards, microwaves and radio waves, lasers, Air

sampling instruments, common causes of industrial fires, dust sample collection devices. Industrial Psychology, Ergonomics and Accidents

Module IV- Control Measures for Industrial Hazards

(8 Hours)

Safety in Hazardous Area, Industrial Safety Analysis, Risk Analysis and Risk Management, Industrial Noise and Noise Control Work Permit System ,Safety in Power Plants, Fire Prevention and Fire fighting in Plants ,Portable Fire Extinguishers ,Fire Detection, Fire Alarm and Fire Fighting Systems, Building Design and Fire Protection ,Plant Layout and Design Material, Safety during Project Construction, Safety Management of Plants During Commissioning and Maintenance ,Safety Training for Employees and Human Resource Development, Social Security in Industries, Insurance Policies for Project Construction, Operation and Maintenance, Important Ingredients of Health, Occupational Health, First Aid ,Exercises for Healthy Living. Occupational Health and Industrial Hygiene, Controlling Environmental Pollution, Environmental Guidelines for Power Plants and Infrastructure Development Energy, Conservation, Efficiency and Audit, Disaster Management.

Module V- Presentation's, case studies, Assignments, Tutorials based on Module I toIV (8 Hours)

References:

Text:

1. Slote L. handbook of Occupational safety and Health, John Willey and sons, Newyork.
2. Frank P Lees, Loss of Prevention in process industry , Vol 1 and 2, Butterworth-Heinemann Ltd , London.
3. R.K.Jain and Sunil S. Rao : Industrial Safety , Health and environment management systems, Khanna publishers, New Delhi 2006

Suggested Reading:

1. Grimaldi and Simonds, Safety management: ATTBS publishers, new Delhi 2001
2. Industrial safety and pollution control handbook; national safety council and associate publishers pvt. ltd; Hyderabad
3. Code of practice on Safety management :- PDF
4. <http://www.saylor.org/books>
5. The Business Ethics Workshop

VOC- 402: Business Software Tools

(4 credits 100 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Discuss and apply CSS and Photoshop
2	Discuss and apply Dreamviewer and Flash
3	Explain and apply key concepts of CMS (Computer Management System)
4	Create different projects using CMS
5	Discuss and apply key concepts of hypertext processor

Course Contents:

Module I: CSS and Photoshop

(8 Hours)

Introduction to CSS: Concept of CSS, Creating Style Sheet, CSS Properties, divs and spans, ids and classes, CSS Styling, Working with block elements and objects, working with Lists and Tables, internal CSS declarations, CSS formatting and alignment

CSS Advanced: CSS color, Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Image Sprites, Attribute selector, Creating page Layout and Site Designs, Embedded audio files

Module II: Dreamweaver and Flash

(8 Hours)

Introduction to Photoshop: Creating new files, Resizing images, Image transformations, Levels & Color Balance, Cropping, The Ruler Tool, Zooming, History Panel, Saving & file formats.

Photoshop Advance: Selections, Extracting regions of an image, Combining images (basic), Introduction to layers, Layer styles, History panel, Setting up your workspace, Frames & Objects, Working with text, Text formatting, Paragraph formatting, Linked text frames.

Module III: Management System

Introduction of CMS in Web Development, Configuring a domain name and web hosting, Exploring CMS terminology, including open source, server-side, client side, Static HTML website, how CMS web pages are generated, Website strategy and planning, site mapping, content planning, Introduction of Joomla, Adding and displaying menus in Joomla, Linking menus to articles and other features Joomla

Dreamweaver: Dreamweaver basics, Setting up your workspace, Site management, Text formatting, Images & Media, Links, styles, Inserting Tables, Adding Frames, Rollovers, Putting it all together

Flash basics: Introduction to the Flash IDE, Creating a new project, Drawing simple vector shapes, Lines & Fills, Colors, Shape Tweens, Layers

Flash advance: Review symbols and instances, Review internal timelines, 3D rotation tool, Mask layers, Deco Brush, Custom mouse pointers

Module IV: PHP (Hypertext Preprocessor)

(8 Hours)

Introduction, installation , syntax , variables, echo/print, data types, constant, string operators, if-else else if, switch, while, for, array, super globals, Form validation, form required Array Multi, Date and Time, Include, File open read, create / write, upload, Cookies, Sessions, My Sql-Connect, Create DB, Create Table, Insert Data, Prepare , select, delete and updates

References:

Text:

1. Thomas POW; 2010; HTML & CSS: The Complete Reference (Fifth Edition); Mc Graw Hill Education; USA.
2. Thomas Powell and Fritz Schneider; 2013; JavaScript: The Complete Reference Paperback (Third Edition); Mc Graw Hill Education; USA
3. Steven Holzner; 2008; PHP: The Complete Reference (Second Reprint); Tata Mc Graw Hill Publishing Company Limited; New Delhi
4. Graig Grannell; 2007; The Essential Guide to CSS and HTML Web Design; Apress
5. Nicholas C. Zakas (2012); Professional Javascript for Web Developers; John Willey and Sons (Third Edition)
6. Kogent Learning Solutions Inc; 2009; Dreamweaver Cs5 in Simple Steps by Dreamtech Press, New Delhi.

VOC 403: Fundamentals of Business and Accounting

(4 credits 100 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Describe overall concept of a business system, process of identification of entrepreneurial opportunities in business and process of setting up a business enterprise
2	Explain concepts, terminologies and Functioning of Financial Accounting
3	Elaborate Accounting terms, Equation and Journal
4	Explain and apply Voucher approach in accounting
5	Explain the terminologies and prepare trading and profit./loss account and balance sheets

Course Contents:

Module- I : Introduction to Business (8 Hours)

Concept, Nature and Scope of Business Enterprise; Concept of Business as a System; Business and Environment Interface; Entrepreneurial opportunities in contemporary business environment or emerging trends in business: Networking marketing, Franchising, Business Process Outsourcing, knowledge Process Outsourcing, Ecommerce and M-Commerce. Opportunity and Idea Generation - role of Creativity and Innovation. Feasibility study and preparation of Business Plan Basic considerations in setting up a Business Enterprise. Process of setting up a Business Enterprise.

Module- II : Introduction to Financial Accounting (8 Hours)

Accounting-An Introduction: Business transactions, Book-keeping, Accounting and its branches. Nature, functions and objectives of Financial Accounting. Accounting Assumptions-Accounting Concepts: Meaning, concepts: Matching, Accrual, Realisation and Dual Aspect Concept.

Module- III: Accounting Terms, Accounting Equation and Journal (8 Hours)

Accounting Terms-Accounting Equation Need of Accounting equation, Meaning and preparation of Accounting equation. Rules of Accounting -Journal Meaning, classification of journal into General journal and special journals (with examples). Incorporation of journal entries involving different accounts. Cash Book Meaning, types-Simple Cash Book, Two column Cash Book and Three column Cash Book.

Module- IV : Voucher Approach in Accounting and Financial Statements (8 Hours)

Vouchers and their preparation - Day Book and Subsidiary Day Books -Recording the vouchers into Day Books -Recording the Vouchers into Subsidiary Day Books -Ledger

Posting of Day Book -Posting of Subsidiary Day -Trial Balance -Errors and their Rectification .

Capital and Revenue - Preparation of Trading and Profit and Loss Account and Balance Sheet - Preparation of Trading and Profit and Loss A/c and Balance Sheet (with adjustments).

Module- V : Tutorials, assignments and presentation based on Module I to IV (8 Hours)

References:

1. Anthony, R.N., and J.S. Reece, "*Accounting Principles*", Richard D. Irwin, Inc.
2. Monga, j.R., "*Financial Accounting: Concepts and Applications*", Mayoor Paper Backs, New Delhi.
3. Shukla, M.C., T.S. Grewal and S.C.Gupta, "*Advanced Accounts*", Vol-I, S.Chand& Co., New Delhi.
4. Gupta, R.L. and M. Radhaswamy, "*Advanced Accountancy*", Vol-I, Sultan Chand & Sons, New Delhi.
5. Maheshwari, S.N. and. S. K. Maheshwari, "*Financial Accounting*", Vikas Publishing House, New Delhi.
6. Tulsian, P.C., "*Advanced Accounting*", Tata Me Graw Hill, New Delhi.
7. "*Compendium of Statements and Standards of Accounting*", The Institute of Chartered Accountants of India, New Delhi.

Semester – IV

Automobile

(Skill Development Components)

Skill Development Components

Automobile

VOC 431 Fundamentals of Machines and Mechanism(AU)

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Define Rigid body and resistant body, Types of links, joints, gears, fly wheels, cams, Followers.
CO2	Explain Functions of governor, wheels, gears
CO3	Sketch Cam and follower diagram, cycloidal profile, involute profile, Calculate, Co-efficient of energy, Co-efficient of speed.
CO4	Distinguish between Cam And follower, Single slider and double slider crank chain.
CO5	Test different types of mechanism, single slider crank chain, old hams couplings, Ackerman's link, withworth return mechanism.
CO6	Design different types of gears, and its meshing, design cam and followers,

Module – I Introduction to Machine and Mechanism

(6 Hours)

Rigid body and resistant body, Kinematic link, Types of links, Kinematic pair, Types of constrained motions, Types of Kinematic pairs, Kinematic chain, Types of joints, Mechanism, Machine, Degree of freedom (Mobility), Four bar chain, Slider crank chain, Quick Return Mechanism, Double slider crank chain, Steering gear mechanisms

Module – II Gear

(6 Hours)

Introduction, Classification of gears, Functions of gears, Gear nomenclature: Center distance, Gear ratio, module, circular pitch, pitch circle, etc., Law of gearing, Forms of teeth, cycloidal profile, involute profile, path of contact, arc of contact, contact ratio, interference and undercutting

Module – III Flywheel and Governor

(6 Hours)

Introduction, Functions of fly wheel, Types of fly wheels, Co-efficient of energy, Co-efficient of speed, Governor, Functions of governor, Types of governor – Principle, construction and working of Watt governor Porter governor, Hartnell governor, comparison between a fly wheel and governor

Module – IV Cams and Followers

(6 Hours)

Introduction, Classification of cams, Followers and their classification, Brief description of different types of cams and followers with simple line diagram, Simple cam profile for uniform velocity, SHM and uniform acceleration and deceleration with Flat, knife edge and roller type follower.

Module -V Tutorials, case studies and presentation based on Module I to IV

(6 Hours)

VOC 432 Automobile Transmission

(02 credits – 50 marks)

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

Course Content:

Module - I: Clutch, Gearbox, Propeller Shaft

08 Hours

Introduction to transmission system, (A) **Clutch**- principle operation of clutch, friction material, classification of clutch and working, clutch adjustment, troubleshooting of clutch. (B) **Gearbox**- gear ratio, types of gear boxes, gear shifting, lubrication of gear box, troubleshooting of gear box, Automatic transmission (C) **Propeller shaft**- General aspects, types of propeller shaft, troubleshooting of propeller shaft

Module - II: Universal Joint, Final Drive, And Differential

05 Hours

(A) **Universal Joint**- introduction, Construction and working of universal joint, types of universal joint, (B) **Final Drive**- introduction, classes of final drive, advantages, disadvantages (C) **Differential**- Introduction, construction, operation, types of differential, troubleshooting of differential

Module - III: Steering, Front Axle and Rear Axle

07 Hours

(A) **Steering system**- Purpose of steering system, function, general arrangement, working of steering mechanism, steering gears, steering ratio, steering geometry, types of steering gear box, steering linkages (B) **front axle**- introduction, construction, types of front axle,

(C) **Rear axle** – introduction, types, causes of axle failure, rear axle noises, maintenance of rear axle, troubleshooting of rear axle

Module - IV: Chassis and suspension

04 Hours

Introduction to chassis, classification of chassis, frame, body, vehicle dimension, introduction to suspension system, function, requirement and element of suspension system, spring, dampers, suspension systems, wheels and tyres

Module -V Tutorials, case studies and presentation based on Module I to IV
06 Hours

References:

1. Automotive Engines, [William H. Crouse](#) (Author), [Donald Anglin](#) (Author), [Donald L. Anglin](#), McGraw-Hill Education (ISE Editions); (1994), ISBN-10: 0071138846, ISBN-13: 978-0071138840.
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
5. Modern transmission A.W.Judge Chapman and Hall std 1989

VOC-433: Auto-Electrical System

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Introduction to electrical system its fundamentals and starting system
CO2	Explain charging system its requirement, Generator (dynamo), Alternator etc.
CO3	Explain Troubleshooting of Generator (dynamo), Alternator.
CO4	Explain ignition system its purpose requirement etc.
CO5	Explain lighting and accessory system in automobile.

Course Content:

Module - I: Starting System **03 Hours**

Introduction to electrical system, fundamentals of electrical system, terminology in electrical system, starting system, battery, starting motor

Module - II: Charging System **07 Hours**

Introduction to charging system, requirement of a charging system, Generator (dynamo), troubleshooting of dynamo, Alternator A.C. Generator, working, constructional details. Troubleshooting of alternator

Module - III: Ignition System **07 Hours**

Introduction to ignition system, purpose of ignition system, requirement of ignition system, components of ignition system, types of ignition system, ignition timing, troubleshooting of ignition system

Module - IV: Lighting and Accessory system **07 Hours**

Introduction, main circuit of automobile electrical system, lighting system, lighting switches, indicating light, Accessories, fuel gauge, horns, direction indicator, water temperature gauge, speedometer, odometer, ventilating system, air conditioning system, troubleshooting

Module -V Tutorials, case studies and presentation based on Module I to IV **06 Hours**

References:

1. Automotive Engines, [William H. Crouse](#)(Author), [Donald Anglin](#)(Author), McGraw-Hill Education (ISE Editions); (1994), ISBN-10: 0071138846, ISBN-13: 978-0071138840.
2. Ken Layne , Automobile electrical system , vol I 1989 ISBN 0471617636
3. Automobile engineering, Dr. R.K.Rajput ISBN:81700089913 Reprint 2015
4. Narang GBS “ Automobile Engineering Khanna publication New Delhi

VOC 434 Automobile Systems

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Explain Fuel system S.I. engine.
CO2	Explain Fuel system C.I. engine.
CO3	Explain Lubrication system and cooling system, necessity of engine cooling.
CO4	Explain Braking System and its type.

Course Content:

Module - I: Fuel system- S.I. engine

06 Hours

Introduction to Carburetion and carburetors, induction system, factors influencing carburetion, distribution, simple carburetor, types of carburetor, theory of carburetor

Module - II: Fuel system- C.I. engine

06 Hours

Introduction to fuel injection system, functional requirement of a injection system, function of fuel injection system, fuel pump and fuel injector, types of nozzle and fuel spray pattern, engine starting system, trouble shooting of fuel system, troubleshooting of carburetors

Module - III: Lubrication system and cooling system

06 Hours

Effect of engine parameter on engine friction, determination of engine friction, lubrication and lubrication system, crankcase ventilation, necessity of engine cooling, cooling air and water requirement, specification of cooling system of an engine, troubleshooting of cooling system.

Module - IV: Braking System

06 Hours

Introduction, necessity, function, requirement, classification, factor controlling the stop of an automobile, arrangement of brake in different vehicles, Vacuum assisted brake, Eddy current brakes, brake tester, troubleshooting

Module -VTutorials, case studies and presentation based on Module I to IV 06 Hours

References:

1. Automobile engineering, Dr. R.K.Rajput ISBN:81700089913 Reprint 2015
2. Automotive Engines, [William H. Crouse](#), [Donald Anglin](#) [Donald L. Anglin](#), McGraw-Hill Education (ISE Editions); (1994), ISBN-10: 0071138846, ISBN-13: 978-0071138840.
2. Automotive Engines, Ellinger.H.E, Prentice Hall Publishers (1992).
4. Advanced Engine Technology, Heinz Heister, SAE, 1995.
5. Narang GBS “ Automobile Engineering Khanna publication New Delhi

VOC 435 Lab course based on Automobile Transmission

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Assemble and Dismantle the Single plate and multi plate clutch of automobile.
CO2	Diagnose and Repair faults in gearbox.
CO3	Assemble and Dismantle all types of steering gearbox
CO4	Demonstrate the construction and working of power steering system.

1. Assembly and Disassembly of Single plate clutch: Coil Spring, Diaphragm type
2. Assembly and Disassembly of Gearbox: Synchromesh, Constant Mesh type
3. Assembly and Disassembly of Suspension System
4. Demonstration of power steering system and various types of steering gearbox.
5. Assembly and Disassembly of Steering gear box
6. Demonstration of Differential gearbox
7. Demonstration of different types front and rear axles.

VOC-436 Laboratory Course based on Auto Electrical System

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Explain battery charging and its precaution and show how it works actually.
CO2	Explain of battery testing by different types of test show how it works actually..
CO3	Explain battery ignition system and its types show how it works actually.
CO4	Explain Electronic ignition system show how it works actually.
CO5	Explain lighting and accessory system in automobile.

Course Content:

1. Demonstration of battery charging and its precaution.
2. Demonstration of battery testing by different types of test.
3. Demonstration of battery ignition system.
4. Demonstration of Electronic ignition system.
5. Demonstration of different lighting and accessory system in automobile.
6. Demonstration of overall automobile electric wiring circuit
7. Troubleshooting of Starter Motor and Alternator

VOC-437 Laboratory Course based on Automobile System

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Define what is SI system, its working
CO2	Demonstration of MPFI system
CO3	Explain Air brake system
CO4	Demonstration of Trouble shooting of Hydraulic Break system
CO5	Demonstration of Trouble shooting of fuel system

Course Content:

1. Demonstration of SI engine fuel system.
2. Assembly and Disassembly of F.I.pump.
3. Demonstration of MPFI system.
4. Demonstration of CRDI system.
5. Demonstration of Air Brake system
6. Demonstration and Troubleshooting of Hydraulic Brake system
7. Troubleshooting of fuel system (SI and CI).

VOC-438 Laboratory Course based on Auto-CAD

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Explain Auto Cad user interface.
CO2	Explain commands used in Auto-Cad.
CO3	Explain difference between 2D and 3D drawings.
CO4	Draw 2D drawings of various machine components.

Course Content:

Any Six Autocad drawings of following machine/Automotive components

1. Coupling
2. Connecting Rod
3. Piston
4. Knuckle Joint
5. Crankshaft
6. Hexagonal headed bolt
7. Bracket
8. Hexagonal nut

Semester – V
General Academic
Components

General Education Components

VOC 501: Personality Development and Stress Management

(04 credits – 100 marks)

Course Outcome:

On completion of the course, students will be able to –

1	Define and describe basic traits of personality, discover individual strength and weakness, and plan corrective and developmental exercises
2	Administer communication skills for debates, elocution, convincing skills etc., point out necessities for personal grooming, and compare among various modes of etiquettes
3	Identify and explain stress and its various forms, relate it with physiological and psychological illness.
4	Demonstrate necessities for stress management
5	Demonstrate measures for stress management

Module- I: Personality Development

(8 Hours)

Basic traits of personality - Dress, address, gestures and manners; Self evaluation and development- identification of strengths and weaknesses; Overcoming hesitation and fear of facing the public; Corrective and developmental exercises - confidence building, role plays.

Module- II: Communication and Personal Grooming

(8 Hours)

Advance communication skills- debates, elocution, persuasive communication, convincing Skills, conversations. Personal grooming and business etiquettes, corporate etiquette, social etiquette and telephone etiquette, role play and body language, impression management.

Module- III: Stress

(8 Hours)

Meaning - Approaches to stress, Good Stress Vs Bad Stress, The individual and work. Manifestations of Stress - Stages of Stress, Signs of Stress at work, Personal types and Stress. General sources of Stress - Stress and Health - Physiological and psychological illness.

Module- IV: Stress Management

(8 Hours)

Stress Diary, Becoming change skilled, Adopting a healthy life style, Right attitude, Thought Awareness, Imaginary (Auto-genic Therapy), Learning to relax, Correct breathing, Value and goal planning, Time Management, General advice - The individual's ten Commandments for effective Stress management.

Module- V : Tutorials, assignments and presentation based on Module I to IV (8 Hours)

References:

1. Interpersonal Skills for Travel and Tourism - Jon & Lisa Burton - Longman Group Ltd.
2. Business Communication - Rayon and V. Lesikar, John D. Pettit, JR. - Richard D. Irwin, INC
3. Managing Stress, Ann Edworthy, Open University Press, Buckingham, Phildephia.
4. Organizational Stress, K.Hari Gopal, University Press.

General Academic Components

VOC 502 Operation Management

(2 Credits: 50 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Define Operation Management, Operations Strategy, Describe Basics of Work Study, Job Design and Work Measurement, Basics of ISO 14000 / 9000, Basics of Value Engineering & Analysis
2	Summarise Aggregate Planning, Scheduling, Project Management, express Supply Chain Management and Just-in-Time/Lean Operations, Classification of production system,
3	Illustrate Capacity Planning, Waiting Lines, Demand Management-models, , Total Quality Management, , Batch Sizing- Models- Optimization, Batch Scheduling-models-optimization ,
4	Explain Evolution of Production Systems Competitive Advantage and Time Based Competition
5	Discuss Product Decision and Analysis, Product Development, Process Selection, Process Design, Process Analysis, Process-Product Matrix, and Capacity Decisions
6	Develop Facility Location, Facility Layout, and Resource Planning-models

Module I Introduction to Operation Management

(8 Hours)

Introduction to Operation Management, Operations Strategy, Role of Operations Strategy, Importance of Operation strategy, Classification of production system – Job shop, Batch, Mass, Continuous production, Competitive Advantage, Time Based Competition.

Module II Product Decision and Analysis

(6 Hours)

Product Decision and Analysis, Product Development, Process Selection, Process Design, Process Analysis, Process-Product Matrix, Evolution of Production Systems, Batch Sizing-Models- Optimization, Batch Scheduling-models-optimization

Module III Demand and Supply

(8 Hours)

Demand Management-models, Resource Planning-models, Total Quality Management, Supply Chain Management and Just-in-Time/Lean Operations.

Module IV Introduction to Planning and Scheduling

(8 Hours)

Aggregate Planning, Basics of MRP / ERP, Basics of Scheduling, Job Design and Work Measurement, Basics of ISO 14000 / 9000, Basics of Value Engineering & Analysis

**Module V- Presentation's, case studies, Assignments, Tutorials based on Module I to IV
(6 Hours)**

Reference text:

1. Production & Operations Management -S. N. Chary
2. Operations Management – S.Anil Kumar, N.Suresh- New age International Publishers
2. Operations Management – Andrew Greasley - SAGE Publications
3. Modern Production Management -By E. S. BUFFA
4. Production and Operations Management -By Norman Gaither
5. Theory and problem in Production and operations Management -By S. N. Chary
6. Production and operation Management - By Chunawalla Patel
7. Production & operation Management – KanishkaBedi– Oxford
8. Production & operation Management – R.C. Manocha
9. Production & operation Management – Muhlemann

VOC- 503: Business Communication

(4 Credits 100 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Explain characteristics of successful communication, communication structure in organization
2	Apply communication as a tool to resolution of conflicts
3	State and use principles of effective writing
4	Discuss analyze and present a case study
5	Categorize communication areas and construct monologues/ dialogues for effective communication as per situation

Module- I: Introduction

(8 Hours)

Meaning & Definition, Classification, Role; Characteristics of successful communication – Importance of communication in business – Communication structure in organization – Communication in conflict resolution - Communication in 31 crisis. Communication and negotiation. Communication in a cross-cultural setting. Personality and Emotion interference.

Module- II: Writing Skill and Case Analysis

(8 Hours)

Principles of effective writing – Approaching the writing process systematically: The 3X3 writing process for business communication: Pre writing – Writing – Revising – Specific writing features – Coherence – Electronic writing process. Writing routine and persuasive letters – Positive and Negative messages Writing Reports, Writing memos

Different types of cases – Difficulties and overcoming the difficulties of the case method – Reading a case properly (previewing, skimming, reading, scanning) – Case analysis approaches (Systems, Behavioural, Decision, Strategy) – Analyzing the case – Dos and don'ts for case preparation – Discussing and Presenting a Case Study

Module- III: Employment Communication and Negotiation

(8 Hours)

Introduction – Composing Application Messages - Writing CVs – Group discussions – Interview skills Impact of Technological Advancement on Business Communication – Technology-enabled Communication - Communication networks – Intranet – Internet – e mails – SMS – teleconferencing – videoconferencing

Negotiation – Nature and need for negotiation – Factors affecting negotiation – Stages of negotiation process – Negotiation strategies

Module- IV: Group Communication

(8 Hours)

Meetings – Planning meetings – objectives – participants – timing – venue of meetings – leading meetings. Meeting Documentation: Notice, Agenda, Resolution & Minutes. Seminars –

workshop – conferences Media management – The press release – Press conference – Media interviews Etiquette Advantage in Business Communication

Module- V : Tutorials, assignments and presentation based on Module I to IV (8 Hours)

References :

1. Business Communication : Concepts, Cases And Applications – Chaturvedi P. D, & Mukesh Chaturvedi ,2/e, Pearson Education, 2011
2. Business Communication: Process And Product – Mary Ellen Guffey, 3/e, Cengage Learning, 2002.
3. Communication – Rayudu C. S, Himalaya Publishing House
4. Business Communication – Lesikar, Flatley, Rentz & Pande, 11/e, TMH, 2010
5. Advanced Business Communication – Penrose, Rasberry, Myers, 5/e, Cengage Learning, 2004
6. BCOM – Lehman, DuFrene, Sinha, Cengage Learning, 2/e 2012
7. Business Communication – Madhukar R. K, 2/e, Vikas Publishing House.
8. Effective Technical Communication - Ashraf Rizvi M, TMH, 2005.
9. Business Communication - Sehgal M. K & Khetrpal V, Excel Books.
10. Business Communication – Krizan, Merrier, Jones, 8/e, Cengage Learning, 2012.
11. Basic Business Communication – Raj Kumar, Excel Books, 2010

General Academic Components
VOC 504 Production Engineering

(2 credits-50 Marks)

Course Outcomes:

On completion of the course, students will be able to –

1	Define Types of production systems, describe Productivity and its Importance , memorize the concept of cost- Fixed cost, Variable Cost etc.
2	Interpret Break even analysis, observe techniques of improving productivity, discuss material handling devices, judge factors affecting Site Selection, review Government Policies, demonstrate work Measurement and time Study, classify allowances,
3	Calculate of Breakeven point, Calculation of EOQ, list methods of Inventory Management, Recording techniques of Process Chart, calculation of standard time
4	Distinguish between production and productivity , selection of plant layout,
5	Describe Economic Batch Quantity, EOQ Model, recommend stores function , storage system , justify FIFO
6	Design Plant Layout, design principles, characteristics of Plant Layout, Symptoms of Bad Plant Layout, modify Storage systems like One bin , Two bin system etc

Module I: Production System

(6 Hours)

Definition , Types of production systems, Productivity - Importance , Measurement of Productivity, Techniques of improving productivity, Elements of cost- Fixed cost, Variable Cost, Break even analysis, Calculation of Breakeven point.

Module II: Plant Location, Plant Layout and Material Handling

(8 Hours)

Plant Location - Importance of Site Selection, Factors affecting Site Selection, Government Policies, and relaxation for Backward Areas. Plant Layout - Objectives, types, design principles, characteristics of Plant Layout, Symptoms of Bad Plant Layout. Group Technology, Cellular layout. Material handling – Need, Principles and Types of material handling devices – conveyors , Hoist & cranes , forklift truck, trolleys, Pipes, Automated Guided Vehicles (AGV's) Selection of Material Handling systems and Devices.

Module III: Work Study and Work Measurement

(8 Hours)

Method Study- Definition, Objectives, Procedure, Selection of work. Recording Techniques:- Process Charts – Outline process chart, Flow process chart, Two Hand process chart, Multiple activity chart, Flow diagram, String diagram, Travel chart. Micro

motion study-Critical Examination, Principles of Motion Economy, Concept of ergonomics and workplace layout.

Work Measurement -Objectives, procedure, Time Study, Time Study Equipments. Stop Watch Time Study, Standard Time, Work Sampling, Analytical Estimating, Predetermined Motion Time Study, Allowances, Calculation of Standard Time, Concept of Merit Rating.

Module IV: Inventory Control

(6 Hours)

Methods of Inventory Management Inventory Cost relationship, Deciding Economic Batch Quantity, EOQ Model, Calculation of EOQ, Concepts of discounts, Introduction of Material Requirement Planning. Stores Function – Storage systems – One bin , Two bin system, Material Issue Request (MIR), Bin card.FIFO

Module V- Presentation's, case studies, Assignments, Tutorials based on Module I to IV

(6 Hours)

References:

1. L.C. Jhamb, Industrial Management, Everest Publication.
2. James C. Rigs Production System, Planning, Analysis & Control, N.Y.Wiley& Sons.
3. O.P. Khanna Industrial Engineering and Management DhanpatRai& Sons.
4. P.C. Sharma Production Engineering
5. Kempster, Introduction to Jigs and Fixtures Design.
6. BaffnaSarin ,Modern Production and Operations Management
7. Terry Wireman, Total Productive Maintenance, Industrial press inc.
8. Taiichiohno, Toyota Production system, Productivity Press.

Semester – V

Automobile

(Skill Development Components)

Skill Development Components

Automobile

VOC 531 Vehicle Testing

(02 credits – 50 marks)

Course Outcomes:

CO1	Select a standard for TA and COP of a given entity in India
CO2	Perform testing of an engine for a given performance parameter
CO3	Perform testing of a vehicle for a given performance
CO4	Identify a standard being followed in testing a given vehicle, a system or an aggregate
CO5	Update for latest developments in vehicular standards

Module I: Introduction

(5 Hours)

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

Module II: Engine, Fuel systems and Emissions testing

(7Hours)

Laboratory testing of engine performance parameters: Measurement of BHP, IHP, Engine testing on dynamometers, different types of dynamometers, engine analyzers- for petrol and diesel engines, FIP calibrating and testing, Emission test for CO, HC, NO_x, CO₂, PM, etc. using exhaust gas analyzers, Orsat apparatus, infrared gas analyzers, Diesel smoke meter.

Module III: Vehicle Performance Testing

(7Hours)

Methods for evaluating vehicle performance- energy consumption in conventional automobiles, performance, emission and fuel economy, Operation of full load and part load conditions, effect of vehicle condition, tyre and road condition and traffic condition and driving habits on fuel economy, Vehicle testing on chassis dynamometers: Two wheel & four wheel dynamometers, wheel alignment testing, wheel balancing, brake test, head light alignment and light intensity testing.

Module IV: Automobile testing standards

(5Hours)

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.

Module –V: Assignments / seminars / case studies on Module -I to Module – IV (06Hours)

References

- 1) Basic of Automobile Engineering -C.P. Nakara-Dhanpatrai Publication
- 2) Automobile Engineering Volume 1-Dr. Kripal Singh-Standard Publisher Distributor
- 3) Automobile Engineering Volume 2-Dr. Kripal Singh-Standard Publisher Distributor
- 4) Automotive Mechanics – William H. Crouse – Tata McGraw Hill Tenth edition.
- 5) Automotive Mechanics – Donald L. Anglin – Tata McGraw Hill Tenth edition.
- 6) Automotive Electrical Equipment – P.L. Kohli - Tata McGraw Hill Tenth edition.
- 7) Automotive Research Association of India Research Institute of the Automotive Industry with the Ministry of Heavy Industries & Public Enterprises, Govt. of India
https://www.araiindia.com/facilities_vehicle_evaluation.asp.

VOC 532 Engine Diagnostics and Troubleshooting

(02 credits – 50 marks)

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:

Module - I: Engine Troubleshooting (5Hours)

Engine causes, Failure of Engine to start, Low power and Uneven running, High oil Temperature, Improper Engine acceleration, failure of engine to idle properly, Engine stops, Engine vibrate excessively.

Module - II: Cooling and Lubrication system Troubleshooting (7Hours)

Troubleshooting of cooling system, Troubleshooting of Lubrication system, overheating, slow warm up, noisy coolant pump, thermostat fault, Low oil pressure, High oil pressure, Excess oil consumption, Defective oil filter.

Module - III: Troubleshooting of fuel supply system (6Hours)

Idling Difficulty, High fuel consumption, Lack of power, Engine splits back, Defective fuel filter, Fuel pump troubleshooting, Testing fuel pressure regulator, Fuel injector cleaning, fuel pump leaks, excessive fuel pump pressure

Module - IV: Troubleshooting of Electrical and Ignition system (6Hours)

Pre ignition, ignition delay, Magneto fails to deliver any spark, Faulty spark, Engine runs but backfires, poor contact of terminals, starter does not stop running, Wiper failure, Battery discharges quickly, Alternator noise, Starter run but pinion will not mesh, solenoid switch.

**Module –V: Assignments / seminars / case studies on Module -I to Module – IV
(06Hours)**

References:

1. Vehicle Body Engineering – Pawloski J., Business Books Ltd., ISBN 10: 0220689164
2. The Automotive Chassis: Engineering Principles – Reimpell J., ISBN: 9781493302864
3. Vehicle Body Layout and Analysis – John Fenton, Mechanical Engg. Publications Ltd.London, ISBN: 9780852984451
4. Body Construction and Design – Giles J. G., Illife Books, Butterworth and Co., ISBN: 1-4051-5592-2.

VOC 533 Metrology
(2 credit 50 Marks)

Course outcomes:

Upon completion of this course, the Students can.

CO1	demonstrate different measurement technologies and use of them in Industrial Components
CO2	Explain correct procedure to be adopted to measure the dimension of the components.
CO3	Explain various Metrological equipments available to measure the dimensions of the components..

Course Content:

Module– I: Introduction to metrology (4Hours)

Definition, types, need of inspection, terminologies, methods of measurement, selection of instruments, measurement errors, units, Measurement standards, calibration, statistical concepts in metrology- use of control chart.

Module– II: Linear and Angular Measurement (8 Hours)

Linear Measurement Instruments, Verniercalliper, Micrometer, Interval measurements: Slip gauges, Checking of slip gauges for surface quality, Optical flat, Limit gauges, Problems on measurements with gauge, go, no-go gauges,Advanced measuringinstruments: Total Station, Theodolite, Types Bevel protractor, clinometers, angle gauges, spirit levels, sine bar, Anglealignment telescope Autocollimator Applications

Module– III: Limits fits and tolerances (6Hours)

Interchangeability, selective assembly, limits, fit and tolerances, limit gauging, design of limit gauges, computer aided tolerance, hole basis system, shaft basis system.

Module– IV:Measurement of surface finish (6Hours)

Introduction, terminology, specifying roughness on drawings, surface roughness parameters, factors affecting surface roughness, ideal surface roughness, roughness measurement methods, precautions in measurement, surface microscopy, surface finish softwares.

Module –V: Assignments / seminars / case studies on Module -I to Module – IV (06Hours)

References:

1. Engineering Metrology – K.J. Hume, Macdonald and Co.(publisher) London
2. The Springer handbook of metrology and Testing, Czichos (Ed), 2011
3. The Metrology Hand book- Jay. L.Bucher (ed), American Society for Quality, 2004
4. Industrial Metrology – Smith GT, 2002,Spinger

VOC 532 A Heat, Ventilation, and Air conditioning (HVAC)

(2 Credits 50 Marks)

Course outcomes

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

CO1	1. Explain the basic concepts of Heat, Ventilation, and Air conditioning.
CO2	2. Solve heating and cooling load calculations for different ambient conditions.
CO3	3. Equip themselves familiar with functions of refrigerating components.
CO4	4. Select refrigerant with less GWP and ODP
CO5	5. Explain the different types of fan and its characteristics

Module I: Air Conditioning Fundamentals

(6 Hours)

Basic Air Conditioning System, Location Of Air Conditioning Components In A Car. Schematic Layout Of A Refrigeration System. Terminologies In HVAC: TR, COP, EER, SEER - Heat Exchanger And Its Types. Air Conditioning Components – Compressor, Condenser, Evaporator Expansion Valve.

Module II: Psychometric

(6 Hours)

Properties Of Moist Air, Psychometric Properties. Use Of Psychometric Chart. Psychrometric Processes In Air Conditioning Equipment. Summer Air Conditioning. Winter Air Conditioning.

Module III: Load Calculation

(6 Hours)

Solar Radiation – Internal Heat Gains, Humidity And Air Flow. Heating Load Estimate And Cooling Load Estimate. Psychrometric Calculations For Cooling. Selection Of Air Conditioning Apparatus For Cooling And De Humidification, Evaporative Cooling.

Module IV: Refrigerant

(6 Hours)

Classification Of Refrigerants, Selection Of Refrigerants. Desirable Properties Of Refrigerant, Containers Handling Refrigerants. Tapping Into The Refrigerant Container. Ambient Conditions Affecting System Pressures.

Module V: presentation, case studies, assignments and tutorials based on module I to V

(6 Hours)

References:

1. C. P. Arora “Refrigeration and Air conditioning” – McGraw Hill Education (India) Private Limited, New Delhi
2. William H. Crouse and Donald I. Anglin - “Automotive Air conditioning” - McGraw Hill, 1983 Reference Books/Other Reading Material
3. Paul Weiser - “Automotive Air Conditioning” - Reston Publishing Co., Inc., - 1990
4. MacDonald, K.I., “Automotive Air Conditioning” - Theodore Audel series – 1978

VOC 534 Hydraulics and Pneumatics

(02 credits 50 Marks)

CO1	Explain basic properties of fluid, important principles of hydraulics with their applications and hydraulic devices used in practice
CO2	Explain construction & working of Elements of Hydraulic and Pneumatic system.
CO3	Carry out troubleshooting and maintenance of Hydraulic & Pneumatic Systems.

Course Content:

Module –I: Introduction to fluid power

(05 Hours)

Classification, application in various fluids of engineering, various hydraulic and pneumatic ISO/JIC Symbols, transmission of power at static and dynamic states, Types of hydraulic fluids and their properties, effect of temperature on fluids.

Module –II: Hydraulic system elements

(07 Hours)

Elements of Pneumatics, Pressure control, direction control, flow control valves, pilot operated, relief, pressure reducing, quick exhaust, sequence valves, meter-in and meter-out circuit and flow through circuit, Electro hydraulics, Types of direction control valves, Actuators – linear and rotary

Module –III: Pneumatic System elements

(07 Hours)

Elements of Pneumatics, Application of pneumatics, physical principles, basic requirement of pneumatic system, Comparison with hydraulic systems, Air compressors, Pneumatic control valves, Pneumatic circuits – Basic pneumatic circuit

Module –IV: Automotive Applications, Maintenance and troubleshooting: (05 Hours)

Hydraulic tipping mechanism, power steering, fork lift hydraulic gear, hydro-pneumatic suspension Maintenance and trouble shooting of hydraulic & pneumatic circuits, pneumatic sensors and applications.

Module –V: Assignments / seminars / case studies on Module -I to Module – IV (06Hours)

References:

1. Industrial Hydraulic & pneumatics – J.J. Pippenger - McGraw Hill, ISBN-13: 978-0070501409
2. Fluid with applications – A. Esposito- PHI Publishers, ISBN:9781292023878
3. Industrial Hydraulic Manual by Vicker Sperry, ISBN 10: 0963416200
4. Practical guide to Fluid Power by H.S. Stewart
5. ISO 1219 Fluid systems and components
6. Hydraulic and Pneumatic Controls, K. ShanmugaSundaram, S. Chand Publication,ISBN : 81-219-2635-1
7. Introduction to Hydraulics and Pneumatics, S. Ilango and V. Soundararajan, PHI Learning Private Limited, New Delhi, ISBN: 9788120330795
8. Hydraulic and Fluid Mechanics, Dr. P N Modi Dr. SM Seth, Standard Book House, Delhi, ISBN No, 978-81-89401-26-9
9. Hydraulic & pneumatics- Andrew Parr-Jaico Publishing House, ISBN-9780080966748

VOC 531 A Fuel Testing and Standards

(2 credits- 50 marks)

Course outcomes

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

CO1	Explain the different types of fuels used in automotive industry and importance of fuel testing.
CO2	Explain Regulations and different Standards, A retrospection of fuel quality improvement and related amendments
CO3	Explain Properties of fuels influencing IC engine performance.
CO4	Explain testing methods for gasoline and diesel.
CO5	Explain testing methods for biodiesels, CNG and LPG.

Module 1: Automotive Fuels

(6 Hours)

Petroleum, Diesel, CNG- sources and composition. LPG, Alcohol and biodiesels –sources and composition. Reformulated fuels and additives-Types and Use. Importance of fuel testing – An overview of the different standards available for fuel testing-EN, ASTM, ISO, JIS BIS.

Module 2: Reference and Commercial Fuels

(6 Hours)

Technical Specification of Reference Fuel for Testing Vehicles -Gasoline, Diesel, CNG, LPG. Comparison of the Specification of Commercial Gasoline And Commercial Diesel For Different Bharat Stage Norms. Fuel Quality Improvement Accomplished In India, Fuel Quality Compliance Issues- Fuel Testing, Presumptive Liability, Fuel Registration And Tracking-A Comparison In Fuel Testing and Standards India, USA And Japan. Inhibiting Factors In Fuel Quality Improvement In India

Module 3: Fuel Properties.

(6 Hours)

Properties Of Different Fuels-Volatility, Oxidation Stability, Octane And Cetane Rating. Calorific Value, Density, Viscosity, Carbon Residue Etc. Characteristic Requirements Of Different Fuels In IC Engines- Availability, Fuel Economy And Performance. Gasoline Quality Effects On Vehicle Emissions, Diesel Quality Effects On Vehicle Emissions-Ultra Low Sulphur Fuels

Module 4: Commercial Gasoline and Diesel Fuel Testing as Specified In BIS(6 Hours)

Method to determine Distillation temperatures, Research Octane Number (RON), Motor Octane Number (MON). Calorific value, Oxidation Stability, Sulphur content, Reid Vapour Pressure, Benzene, Aromatic Olefin and oxygen content. Method to determine Ash content, Carbon residue, Cetane number and Index. Distillation temperature, Flash point, Kinematic viscosity, density, calorific value. Test for sulphur and water content, Cold filter plug point, Copper strip corrosion, Oxidative stability, Polycyclic Aromatic Hydrocarbon

Module 5: presentation, case studies, assignments and tutorials based on module 1 to 5(6 Hours)

Reference Books/Other Reading Material

1. Keith owen, trevor coley “automotive fuels reference book” second edition, sae inc.,1995
2. “Motor vehicles act” .,2009, India
3. ARAI Tap Document “Document on Test Method, Testing Equipments and Related Procedures for Testing Type approval and Conformity of Production (COP)”.,Ministry of Road Transport and High ways
4. Amit Sarin “Biodiesel Production and Properties “RSC Publishing ,2012
5. Sajid Zaman “Practical Handbook on Fuel Properties and Testing” Lambert Academic Publishing,2014
6. S.S. Thipse “Alternative fuels concepts technologies and developments” Jaico Publishing House

VOC 535 Lab course on Engine Diagnostic and Troubleshooting.(AU)

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Identify Various troubles related to engine and vehicle, identify various engine scanner available in Indian as well as other than Indian markets
CO2	Explain characteristics of automobile petrol engine and automobile diesel engine also Alternate fuel used in the vehicles.
CO3	Apply necessary remedies on Charging system, Fuel supply system, Ignition system and Electrical system.
CO4	Distinguish between C.I. Engine and S. I. Engine
CO5	Troubleshoot of various problem such as Charging system, Fuel supply system, Ignition system and Electrical system.
CO6	Modify new technical to solve Heavy fuel consumption, Rich and lean mixture, hard starting and cold starting,

Course Content:

1. Diagnosis of C.I. Engine Trouble by using engine scanner
2. Diagnosis of S.I. Engine Trouble by using engine scanner
3. To study the performance characteristics of automobile petrol engine
4. To study the performance characteristics of automobile diesel engine
5. To study the performance characteristics of automobile engine operated on alternate fuel (CNG, LPG, Bio Diesel).
6. Troubleshooting of Charging System: Discharge Battery, Ammeter shows no charge, Ammeter shows overcharge
7. Troubleshooting of Fuel supply system: Heavy fuel consumption, Lean Mixture in high speed, Hard starting when engine is cold, Hard starting when engine is hot.
8. Troubleshooting of Ignition system: Engine misfire on one cylinder, Engine misfires irregularly on all cylinder
9. Troubleshooting of Electrical system: Dynamo is not produce voltage, Battery is not charge when engine is running, and Alternator makes noise when running.

VOC 536 Hydraulic and Pneumatic Lab

(2 Credits)

List of Practical's:

1. Understand and Verify Bernoulli's theorem by using Bernoulli's Apparatus.
2. Calculate the coefficient of discharge (Cd) of Venturimeter by using setup of convergent - divergent section.
3. Determine overall efficiency of Centrifugal Pump & plot its operating characteristics by using Centrifugal pump test rig.
4. Dismantling and assembly of reciprocating pump to identify components, functions of each component and prepare trouble shooting chart.
5. Understand operation of Hydraulic trainer having simple circuit actuation with single acting cylinder.
6. Understand functions of various components in pneumatic trainer with simple circuit actuation of double acting cylinder.
7. Construct and operate speed control Hydraulic circuit for speed control of Double Acting Cylinder by Meter in, Meter out, By pass methods.
8. Understand faults, probable causes and remedial action that can be taken to trouble shoot problems in hydraulic circuits
Perform mini project on practical application of hydraulic and pneumatics.

VOC 535 A Engine and Fuel Testing Laboratory

Course outcomes

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

CO1	Test the lubricants and fuels used for IC engines
CO2	Conduct the performance and heat balance test on IC engines using various dynamometers
CO3	Conduct the test of fuels

Course Contents

1. Morse test on petrol engines
2. Test for optimum coolant flow rate in IC engines
3. Energy Balance test on an Automotive Diesel Engine
4. Determination of flash and fire point of fuels and lubricating oil by different methods

5. Determination of viscosity of oil by different methods like, Redwood, Say bolt and Engler's Viscometer

6. Study and use of pressure pickup, charge amplifier, storage oscilloscope and signal analyzers used for IC Engine Testing

VOC 537
Major Project – Phase I

(02 credits)

(Review of Literature/ Industrial Orientation, Formulation of Topic, Experimental Plan)

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 research/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 Research/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
- (iv) and finally, draft a systematic experimental plan to achieve projected goal
- (v) deliver regular presentations
- (vi) 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/herself

Semester – VI

General Academic Components

Semester – VI

General Education Components

VOC 601: Foreign Language (German/Chinese/Japanese/Russian)

(4 Credits: 100 Marks)

Course outcomes

After completion of this course, students will be able to -

1	Effectively communicate read, write Hiragana and Katakana of Japanese scripts,
2	Explain basic kanjis
3	Can participate in simple Japanese conversation.

Module 1: Scripts in Japanese- Hiragana, katakana and introduction to Kanji. Self introduction, Daily used greetings, expressions used in the classroom. Introduction to Japanese Grammar **(10Hours)**

Module 2: Day, date, nos., grammar related to place and time Counters **(12Hours)**

Module 3: Introduction to adjectives and verbs **(12Hours)**

Module 4 : Forms of adjectives, verb tense forms **(12Hours)**

Module 5: Tutorials, Case studies and presentation based on Module I to IV **(02Hours)**

References:

Minna no nihongo I

Japanese for Busy People

Kyoukasho wo tsukuro

VOC-- 602: ENTREPRENEURSHIP DEVELOPMENT
(4 Credits: 100 Marks)

□ **Course Outcomes:**

After completion of this course, students will be able to

1	Describe distinct entrepreneurial traits
2	Interpret the parameters to assess opportunities and constraints for new business ideas
3	Summarize a systematic process to select and screen a business idea
4	Design strategies for successful implementation of ideas
5	Prepare a business plan

Module I: **(8 Hours)**

Entrepreneur - meaning - importance - Qualities, nature types, traits, culture, Similarities and differences between entrepreneur and entrepreneur. Entrepreneurship and economic development - its importance, Role of entrepreneurship, entrepreneurial environment. Evolution of entrepreneurs - entrepreneurial promotion: Training and developing motivation: factors - mobility of entrepreneurs - entrepreneurial change - occupational mobility - factors in mobility - Role of consultancy organizations in promoting entrepreneurs

Module II: **(8 Hours)**

Small Business : Concept & Definition, Role of Small Business in the modern Indian Economy, Small entrepreneur in International business; Steps for starting a small industry, registration as SSI, Role of SIDBI; advantages and problems of SSIs; Institutional Support mechanism in India; Incentives & Facilities, Govt. Policies for SSIs

Module III: **(8 Hours)**

Setting MSMEs- location of enterprise - steps in setting - Problems of entrepreneurs - Sickness in small industries - reasons and remedies - Incentives and subsidies - Evaluating entrepreneurial performance - Rural entrepreneurship - Women Entrepreneurship.

Module IV: **(8 Hours)**

Project finance: Sources of finance – Institutional finance - Role of IFC, IDBI, ICICI, LIC, SFC, SIPCOT, and Commercial Bank - Appraisal of bank for loans. Institutional aids for entrepreneurship development - Role of DST, DICS, SIDCO, NSICS, IRCI, NIDC, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureau - Approaching Institutions for assistance.

Module V: **(8 Hours)**

Meeting the entrepreneurs, interviewing them and making a presentation.

REFERENCE

Text:

1. Vasanth Desai —Dynamics of Entrepreneurial Development and Management|| Himalaya Publishing House, New Delhi, India, ISBN 10: 8184884974 ISBN 13: 9788184884975
2. N.P.Srinivasan & G.P. Gupta —Entrepreneurial Development|| S. Chand & Sons, New Delhi, India. ISBN 10: 8170148014 ISBN 13: 9788170148012

Suggested Reading:

1. P.Saravanelu —Entrepreneurship Development|| Eskapee publications.
2. S.S.Khanka —Entrepreneurial Development|| S.Chand & Company Ltd.,
Satish Taneja — Entrepreneur Development|| ; New Venture Creation.

VOC 603 Production Management

(4 Credits: 100 Marks)

□ Course Outcomes:

After completion of this course, students will be able to

CO1	Describe principles and decision analysis related to the effective utilization of the factors of production.
CO2	Describe the nature of how production management is carried out in an organization.
CO3	Analyze the efficiency and effectiveness of processes.
CO4	Describe the nature of products or services in the organization.

Module 1: Introduction: An overview of Production Management (9 Hours)

Production Management: Introduction and overview, Production Management Strategy framework, Understanding similarities and difference among products, goods and services, Historical evolution of production management-Changes & Challenges

Module 2: Product development & production strategy (10 Hours)

Product Strategy and integrated product development, Determining Product Concept, Determining Commonality, Requests for Deviation from Customer Requirements, Developing Design-to-Cost Goals, Determining Production Philosophy and Location, Process Strategy, Capacity Planning Decisions, Facilities Location Strategies

Module 3: System Design (10 Hours)

Facilities Layout and Material Handling Strategy, Develop Preliminary Manufacturing Plan, Identify New Manufacturing Technologies, Determine Product-Packaging Requirements, Develop Prototype Assembly Tooling, Determine Logistical Support Requirements, Group Technology, Flexible manufacturing system, Assembly line balancing, Project Management-CPM PERT, Line of Balance (LOB).

Module 4: Planning and managing operations (10 Hours)

Productivity Concepts: Quality Circle, Kaizen and other SGA, Statistical Quality Control, Maintenance Planning and Control (Reliability, availability, maintainability), Forecasting, Queueing Theory,

Module – V: Tutorials, Case studies and presentation based on Module I to IV(09Hours)

References:

- Aggarwal L.N, ParagDiwan (1997), Management of Production Systems, Global Business Press.
- Alan Muhlemann, John Oakland, Keith Lockyer (1978), Production and Operations Management, Mac Milan , India, IV Edition.
- Artiba and S.E Elmaghaby(1997), The Planning and scheduling of production Systems methodologies and Applications, Chapman & Hall.
- Aswanthappa K, Sridhar Bhatt K(2005), Production and Operations Management, Himalya Publishing House.

Semester – VI

Automobile

(Skill Development Components)

Skill Development Components

Automobile

Skill Development Components - Automobile (A)

VOC 631 Autotronics

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.

Module I: Basic Electronics

(6 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.

Module II: Electronic system for Engine

(4 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

Module III: Electronics for Auxilliaris

(6 Hours)

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

Module IV: Sensors

(6 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

Module -V Tutorials, case studies and presentation based on Module I to IV (2 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.

VOC 632- Farm Equipments and Machinery

(2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Describe the working of farm tractor, farm equipment's and machinery .
CO2	Students will be able to perform servicing and general repairing work of tractors, farm equipment's and machinery.

Module I: Farm Tractor

(6 Hours)

Introduction, basic of tractor as major farm equipment, types of tractor, selection of tractor on basis of power, main parts and components of tractor, selection of tractor on basis of power, main parts and components of tractor, function of each part, electrical and electronic parts, tractor mounting and accessory, safety devices for tractors,

Module II: Farm Equipment

(4 Hours)

Introduction to farm mechanization, scope, classification of farm machines, working attachment of tractors, Implements for intercultural operations, planters, paddy translators, for land developments and soil conservation.

Module III: Farm Machinery

(6 Hours)

Classification of farm machines, elements of farm machinery, selection of machinery used for production of crops, tiller, special features, seed drill, seed cum fertilizer, drill equipments, calibration of seed drill, Tillage, Types of Tillage, Primary and secondary tillage, implements, cultivator function and objective of cultivators, types of cultivators, cultivator design.

Module IV: Servicing and repairing farm equipment & Machinery (6 Hours)

Basic testing tools for repairing and maintenance work their function, specification, study of various types tools and testing equipments, checking tractor for repair, Job card preparation, tractor dismantling and assembly, tractor repairing tools, test codes for performance of tractors and power tillers.

Module -V Tutorials, case studies and presentation based on Module I to IV (2 Hours)

References:

- Farm Machines and Equipments, C.P. Nakara, Dhanpat Rai Publication, ISBN 96991495.
- **Agricultural Machinery Management, Bello R.S, Bello.M.S**, Lambert Academic Publishing, ISBN-13:978-3659779299.
- Farm Machinery And Equipment, Harris Pearson Smith, ISBN-13:978-1446517406.
- **Agricultural Tractor & Machinery**, D.N.Sharma, Jain Brothers, ISBN-13: 978-8183601597.

VOC 633 - Transport Management and Safety Regulations

(2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Explain the current development in transportation and logistics system.
CO2	Perform the critical analysis of transportation system and logistic strategy.

Module - I: Motor Vehicle Act 1989 and Amended Act 2016 (6 Hours)

Short titles and definitions, laws governing use of motor vehicle licensing and registration, taxation structure, insurance type, traffic rules, signals and control, different types of forms, government administrative structure

Module - II: Road Transportation and Cost of service (4 Hours)

Road transportation, Advantages, significance, transport planning, transport terminology, Capital cost, operating cost, fixed cost, variable cost, direct cost and indirect cost.

Module - III: Infrastructure, productivity and efficiency for Public Transportation (6 Hours)

Garages, essential requirement, fleet maintenance record, bus station, bus shelter, bus stops, staffing, management of transport organization, structure of organization, motivation, productivity of road transportation organization, environment, fleet and vehicle utilization, fuel and oil economy, control of breakdown, effective traffic operation.

Module - IV: Road safety (6 Hours)

Driving in comfort, avoiding fatigue, poisonous car fumes, drugs and driving first aid for motorist, first aid kits, braking and stopping, mist care and precaution, ice show skidding, emergencies and road observations. Definition of accident, legal obligation, causes of road accidents, analysis and prevention, insurance documentation, road safety, driver selection test, driver training, security devices

Module -V Tutorials, case studies and presentation based on Module I to IV (2 Hours)

References:

1. Road transport in india, P.G.Patankar (C.I.T.T. Publication)
2. Productivity in road transportation, Santosh Sharma (A.S.R.T.V. publication)
2. Motor Vehicle Act. 1989
4. Compendum of transport Term- (C.I.R.T publication)

VOC 631 A Electric and Hybrid Vehicle

(2 credits- 50 marks)

Course outcomes

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

CO1	Explain electric vehicle technology and electric vehicles
CO2	Explain the basics of hybrid and electric drive trains
CO3	Explain design calculations of hybrid system under study.
CO4	Explain the various vehicle power sources in hybrid vehicle technology

Module I: Electric Vehicle Propulsion and Energy Sources (6 Hours)

Introduction Electric Vehicles. Vehicle Mechanics - Kinetics and Dynamics, Roadway Fundamentals. Propulsion System Design - Force Velocity Characteristics, Calculation Of Tractive Power And Energy Required. Electric Vehicle Power Source - Battery Capacity, State Of Charge and Discharge, Specific Energy, Specific Power, Ragone Plot. Battery Modeling - Run Time Battery Model, First Principle Model. Battery Management System- SOC Measurement, Battery Cell Balancing. 2 C,D 1 1 7. Traction Batteries - Nickel Metal Hydride Battery, Li-Ion, LiPolymer Battery.

Module II: Electric Vehicle Power plant And Drives. (6 Hours)

Introduction Electric Vehicle Power Plants. Induction Machines, Permanent Magnet Machines, Switch Reluctance Machines. Power Electronic Converters-DC/DC Converters - Buck Boost Converter, Isolated DC/DC Converter. Two Quadrant Chopper And Switching Modes. AC Drives- PWM, Current Control Method. Switch Reluctance Machine Drives - Voltage Control, Current Control.

Module III: Hybrid and Electric Drivetrains. (6 Hours)

Introduction Hybrid Electric Vehicles, History And Social Importance. Impact Of Modern Drive Trains In Energy Supplies. Hybrid Traction And Electric Traction. Hybrid And Electric Drive Train Topologies. Power Flow Control And Energy Efficiency Analysis. Configuration And Control Of Dc Motor Drives And Induction Motor Drives. Permanent Magnet Motor Drives, Switch Reluctance Motor Drives, Drive System Efficiency.

Module IV: Electric and Hybrid Vehicles - Case Studies. (6 Hours)

Parallel Hybrid, Series Hybrid -Charge Sustaining, Charge Depleting. Hybrid Vehicle Case Study –Toyota Prius, Honda Insight, Chevrolet Volt. 42 V System For Traction Applications. Lightly Hybridized Vehicles And Low Voltage System. Electric Vehicle

Case Study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid Electric Heavy Duty Vehicles, Fuel Cell Heavy Duty Vehicles

Module V: presentation, case studies, assignments and tutorials based on module I to V (6 Hours)

Reference Books/Other Reading Material

1. Iqbal Husain, "Electric and Hybrid vehicles Design Fundamentals", CRC Press, second edition 2013
2. James Larminie, John Lowry, "Electric vehicle technology Explained" second Edition, Wiley 2012
3. Ali Emadi, "Hand book of Automotive Power Electronics and Motor Drives", CRC Press 2005
4. Ali Emadi, Mehrdad Ehsani, John M. Muller, "Vehicular Electric Power Systems" Marcel Dekker, Inc., 2004

VOC 634 - Design of Automotive Components

(02 credits – 50 marks)

Course Outcomes:

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

CO1	Describe basic concepts in design.
CO2	Describe functional requirements for different components of Automobile.
CO3	Determine static and dynamic loading on different components of Automobile.
CO4	Determine stresses generated due to loading in various components of Automobile.
CO5	Determine dimensions for various components of Automobile.

Course Content:

Module –I: Basic concepts for Design

(4 Hours)

Stress, Strain, Types of Tension failure in metal, Hooks law, elastic constant, thermal stress, torsion, bending moment, twisting moment.

Module –II: Design of shafts, keys and couplings

(8 Hours)

Types of shafts, shaft design on strength basis, shaft design on torsional rigidity basis, shaft in series and compound, keys, function of keys, types of keys, design of square and saddle keys, couplings, design procedure for muff coupling

Module –III: Bearings and Springs

(8 Hours)

Classification of bearings, types of rolling contact bearings, selection of bearings, designation of bearings, bearing failure, hydrodynamic bearing, comparison of rolling contact and sliding contact bearing, mode of failure, life load relation for bearing, types of spring, spring stiffness, strain energy stored in spring, stress concentration factor.

Module –IV: Power Transmission Devices

(8 Hours)

Belt drive, types of belt drive, belt tension, open and cross belt, chain drive, advantages and disadvantages of chain drive over belt drive, power transmission by chain and belt drive.

Module – V: Tutorials, Case studies and presentation based on Module I to IV (02 Hours)

References

1. Reimpell J., "The Automotive Chassis – Engineering Principle" – 2nd Edition, ISBN 9781493302864
2. P. Lukin, G. Gasparyants, V. Rodionov, "Automotive Chassis – Design & Calculation", MIR Publishing, Moscow, ISBN, 1-55623-603-4
3. P. M. Heldt, "Automotive Chassis" ,Chilton Co. NK, ISBN-13: 9781114312395
4. W. Steed, "Mechanics of Road Vehicles" , Illiffe Books Ltd., London ASIN: B0000CKKGV
5. [Keith J Nisbett](#) and [Richard G Budynas](#), "Mechanical Engineering Design" ,Mcgraw Hill Series, 2013, ISBN 13: 9780073529288
6. R. B Gupta, "Auto design", Satya Prakashan, ISBN-13: 9788176840101
7. V.B.Bhandari, "Design of Machine Elements", Tata McGraw Hill publication, 2010, ISBN: 0070681791

VOC 632 A Intelligent Vehicle Technology

(2 credits- 50 marks)

Course outcomes

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

CO1	Explain the intelligent vision system used in automobiles
CO2	Explain the architecture of intelligent transportation system
CO3	Explain adaptive control techniques of an autonomous vehicle.
CO4	Explain about the successful autonomous vehicle projects.

Module I: Introduction to Intelligent Vision System

(6 Hours)

Vision Based Driver Assistance System –Vehicle optical Sensor, Laser Radar. Non-Contact ground velocity detecting Sensor, Road Surface Recognition Sensor. Vehicle Sensors for Electronic Toll Collection System. Components of a Vision Sensor System, Driver Assistance on Highways –Lane Recognition, Traffic Sign Recognition. Driver Assistance in Urban Traffic-Stereo Vision, Shape base analysis and Pedestrian Recognition

Module II: Vehicle Information System and Intelligent Transportation. (6 Hours)

Intelligent Transportation System (ITS) – Vision for ITS Communications. Multimedia communication in a car –Current ITS Communication Systems and Services. Vehicle to Vehicle and Road to Vehicle Communication Systems. Inter and Intra Vehicle Communication. VANETS-Devices-Optical Technologies and Millimeter Wave technologies.

Module III: Adaptive Control Techniques for Intelligent Vehicles

(6 Hours)

Automatic Control Of Highway Traffic And Moving Vehicles. Adaptive Control Of Highway Traffic And Moving Vehicles. Adaptive Control –Gain Scheduling. Model Reference Adaptive Control. Self-Tuning Adaptive Control System Model - System Identification Basics, Recursive Parameter Estimation, Estimator Initialization. Design Of Self-Tuning Controllers –Generalized Minimum Variance (GMV) Control, Pole Placement Control And Model Predictive Control.

Module IV: Decisional Architectures for Autonomous Vehicles.

(6 Hours)

Control Architectures And Motion Autonomy –Deliberative Architectures, Reactive Architectures, Hybrid Architectures.. Overview Of Sharp Architecture, Models Of Vehicles. Concepts Of Sensor Based Maneuver, Reactive Trajectory Following, Parallel Parking, Platooning. Main Approaches To Trajectory Planning, Non-Holonomic Path Planning.

Module V: presentation, case studies, assignments and tutorials based on module I to V

Reference Books/Other Reading Material

1. Ljubo Vlacic, Michel Parent and Fumio Harashima, “Intelligent Vehicle Technologies”, ButterworthHeinemann publications, Oxford, 2001-ISBN 0 7506 5093 1
2. Ronald K Jurgen, “Automotive Electronics Handbook”, Automotive Electronics Series, SAE, USA, 1998. Reference Books/Other Reading Material
3. Nicu Bizon, Lucian D Ascalescu And Naser Mahdavit Abatabaei “Autonomous Vehicles Intelligent Transport Systems And Smart Technologies”, Nova Publishers-2014–ISBN-978-1-63321-326-5

VOC 635 Laboratory Coursework based on Wheel Balancing and Wheel Alignment

(2 Credits: 50 Marks)

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

CO1	Explain static and dynamic balancing.
CO2	Explain Castor, Camber, Toe-in and Toe-out.
CO3	Carry out balancing of tyres.
CO4	Carry out 3D wheel Alignment of automobiles.

List of Practical:

1. Introduction of wheel alignment machine.
2. Introduction of wheel balancing machine.
3. Study on Interpreting wheel alignment readings and charts.
4. Study of Static wheel balancing.
5. Study of dynamic wheel balancing.
6. Study of Caster angle alignment effects.
7. Study of Camber angle alignment effects.
8. Study of Toe in, Toe out alignment effects.
9. Study of Steering Axis Inclination.

VOC 635 A Suspension system laboratory

Course Outcomes:

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

CO1	Explain Suspension system.
CO2	Explain Castor, Camber, Toe-in and Toe-out.
CO3	Carry out replacement of worn out ball joint..
CO4	Carry replacement of worn out suspension components of automobiles.

1. Remove strut and spring assembly and disassemble strut and spring.
2. Assemble strut and spring and install strut and spring assembly.
3. Install strut cartridge off car.
4. Ball joint replacement.
5. Steering knuckle removal, MacPherson strut front suspension.
6. Remove and service rear suspension strut and coil spring assembly.

VOC 636 : Laboratory Coursework based on Solid Modeling

(2 Credits: 50 Marks)

Course Outcomes:

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

CO1	Explain interface required for Computer aided design and drawing.
CO2	Explain commands used in Solid works.
CO3	Design and draw 3D objects in solid works workbench.
CO4	Perform Simulation of objects in interface.

Course Content:

List of Practical's: (Any 08 Practical can be performed)

1. Introduction to solid modeling their commands
2. Design and drawing of Piston
3. Design and drawing of Piston pin and piston rings
4. Design and drawing of Connecting rod
5. Design and drawing of Inlet and Exhaust valves
6. Design and drawing Crankshaft
7. Design and drawing of Camshaft
8. Design and drawing of Gear.
9. Design and drawing of Spring
10. Design and drawing of pin.
11. Engine complete assembly with cylinder block, cylinder head, crankcase, valve ports, water jackets, front and rear end details.

Software Used: PRO-E/ Solidworks /CATIA

VOC 637 Major Project – Phase II

(2 Credits: 50 Marks)

Students will have to submit major project (in continuation to Phase – I) either individually or in a group under supervision and approval of concerned teacher.

VOC 638 In-plant Training/Field work/Mini Project – IV (AU)

(2 Credits: 50 Marks)

Students will have to Undergo In-plant Training/Field work/Mini Project individually or in a group under supervision and approval of concerned teacher.
