Hindustan Institute of Technology & Science
Padur, Kancheepuram District - 603 103.

Syllabus with
Curriculum and Regulations
2008

B.E.
AUTOMOBILE ENGINEERING
ACADEMIC REGULATIONS (B.E. / B.Tech)

1. Vision, Mission and Objectives

1.1 The Vision of the Institute is “To make everyone a success and no one a failure”.

In order to progress towards the vision, the Institute has identified itself with a mission to provide every individual with a conducive environment suitable to achieve his / her career goals, with a strong emphasis on personality development, and to offer quality education in all spheres of engineering, technology, applied sciences and management, without compromising on the quality and code of ethics.

1.2 Further, the Institute always strive

- To train our students with the latest and the best in the rapidly changing fields of Engineering, Technology, Management, Science & Humanities.

- To develop the students with a global outlook possessing, state of the art skills, capable of taking up challenging responsibilities in the respective fields.

- To mould our students as citizens with moral, ethical and social values so as to fulfill their obligations to the Nation and the society.

- To inculcate a flair for research, development and entrepreneurship.

2. Admission

2.1. The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, following guidelines issued by Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each branch of the B.E. / B.Tech programme will be decided by BOM as per the directives from MHRD, Government of India and taking into account the market demands. Some seats for Non Resident Indians and a few seats for Foreign nationals shall be made available.

2.2. At the time of applying for admission, the candidates should have passed / appeared and be awaiting results of the final examination of the 10+2 system or its equivalent with Mathematics, Physics and Chemistry as subjects of study.

2.3. The selected candidates will be admitted to the B.E./ B.Tech. programme after he/she fulfills all the admission requirements set by the Institute after payment of the prescribed fees.

2.4. In all matters relating to admission to the B.E. / B.Tech. programme, the decision of the Institute and its interpretation given by the Chancellor of the Institute shall be final.

2.5. If at any time after admission, it is found that a candidate has not fulfilled any of the requirements stipulated by the Institute; the Institute may revoke the admission of the candidate with information to the Academic Council.

3. Structure of the programme

3.1. The programme of instruction will have the following structure:
i) A general (common) core programme comprising basic sciences, engineering sciences, humanities, technical arts and mathematics.

ii) An engineering core programme introducing the student to the foundations of engineering in the respective branch.

iii) An elective programme enabling the student to opt and undergo a set of courses of interest to him/her.

iv) Professional practice including project, seminar and industrial training.

v) General elective courses, such as, Environmental Studies, Physical Education, Professional ethics, and National Service Scheme.

The distribution of total credits required for the degree programme into the above five categories will nominally be 20%, 50%, 15%, 5%, and 10% respectively.

3.2 The duration of the programme will be a minimum of 8 semesters. Every branch of the B.E. / B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council.

3.3 The academic programmes of the Institute follow the credit system. The general pattern is:
  - One credit for each lecture hour per week per semester;
  - One credit for each tutorial hour per week per semester;
  - One credit for each laboratory practical (drawing) of three (two) hours per week per semester;
  - One credit for 4 weeks of industrial training and
  - One credit for 4 hours of project per week per semester

3.4. For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 180-190.

3.5. The medium of instruction, examination and the language of the project reports will be English.

4. Faculty Advisor

4.1. To help the students in planning their courses of study and for getting general advice on the academic programme, the concerned Department will assign a certain number of students to a Faculty member who will be called their Faculty Advisor.

5. Class Committee

5.1 A Class Committee consisting of the following will be constituted by the Head of the Department for each class:

(i) A Chairman, who is not teaching the class.

(ii) All subject teachers of the class.

(iii) Two students nominated by the department in consultation with the class.

The Class Committee will meet as often as necessary, but not less than three times during a semester.

The functions of the Class Committee will include:

(i) Addressing problems experienced by students in the classroom and the laboratories.

(ii) Analyzing the performance of the students of the class after each test and finding ways and means of addressing problems, if any.
(iii) During the meetings, the student members shall express the opinions and suggestions of the class students to improve the teaching / learning process.

6. Grading

6.1 A grading system as below will be adhered to.

<table>
<thead>
<tr>
<th>Range of Marks</th>
<th>Letter Grade</th>
<th>Grade points</th>
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<tbody>
<tr>
<td>95-100</td>
<td>S</td>
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<td>85 - 94</td>
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<td>C</td>
<td>07</td>
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<td>55-64</td>
<td>D</td>
<td>06</td>
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<td>50-54</td>
<td>E</td>
<td>05</td>
</tr>
<tr>
<td>&lt; 50</td>
<td>U</td>
<td>00</td>
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<tr>
<td>I (Incomplete)</td>
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6.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits $C_i$ of course “$i$” and the grade points $P_i$ earned for that course taken over all courses “$i$” registered by the student to the sum of $C_i$ for all “$i$”. That is,

$$GPA = \frac{\sum C_i P_i}{\sum C_i}$$

CGPA will be calculated in a similar manner, at any semester, considering all the courses enrolled from first semester onwards.

6.3. For the students with letter grades W / I in certain subjects, the same will not be included in the computation of GPA and CGPA until after those grades are converted to the regular grades S to F.

6.4 Raw marks will be moderated by a moderation board appointed by the Vice Chancellor of the University. The final marks will be graded using absolute grading system. The Constitution and composition of the moderation board will be dealt with separately.

7. Registration and Enrolment

7.1 Except for the first semester, registration and enrollment will be done in the beginning of the semester as per the schedule announced by the University.

7.2 A student will be eligible for enrollment only if he/she satisfies regulation 10 (maximum duration of the programme) and will be permitted to enroll if (i) he/she has cleared all dues in the Institute, Hostel and Library up to the end of the previous semester and (ii) he/she is not debarred from enrollment by a disciplinary action of the University.

7.3. Students are required to submit registration form duly filled in.

8. Registration requirement

8.1. A full time student shall not register for less than 16 credits or more than 26 credits in any given semester.

8.2 If a student finds his/her load heavy in any semester, or for any other valid reason, he/she may withdraw from the courses within three weeks of the commencement of the semester with the written approval of his/her Faculty Advisor and HOD. However the student should ensure that the total number of credits registered for in any semester should enable him/her to earn the minimum number of credits per semester for the completed semesters.

9. Minimum requirement to continue the programme

9.1 For those students who have not earned the minimum required credit prescribed for that particular semester examination, awarring letter to the
concerned student and also to his parents regarding the shortage of this credit will be sent by the HOD after the announcement of the results of the university examinations.

10. Maximum duration of the programme

10.1. The normal duration of the programme is eight semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 14 semesters excluding the semesters withdrawn on medical grounds or other valid reasons.

11. Temporary discontinuation

11.1. A student may be permitted by the Dean (Academic) to discontinue temporarily from the programme for a semester or a longer period for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum duration of two semesters.

12. Discipline

12.1. Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

12.2. Any act of indiscipline of a student reported to the Dean (Academic) will be referred to a Discipline Committee so constituted. The Committee will enquire into the charges and decide on suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Academic) to recommend to the Vice Chancellor the implementation of the decision. The student concerned may appeal to the Vice Chancellor whose decision will be final. The Dean (Academic) will report the action taken at the next meeting of the Council.

12.3. Ragging and harassment of women are strictly prohibited in the University campus and hostels.

13. Attendance

13.1. A student whose attendance is less than 75% for a course is not eligible to appear for the end – semester examination for that course. The details of all students who have less than 75% attendance in a course will be announced by the teacher in the class. These details will be sent to the concerned HODs and Dean (Academic).

13.2. Those who have 75% or more attendance for the period other than their medical leave will be considered for condonation of shortage of attendance provided the overall attendance including the period of illness does not fall below 65%. Application for condonation recommended by the Faculty Advisor, concerned faculty member and the HOD is to be submitted to the Dean (Academic) who, depending on the merits of the case, may permit the student to appear for the end semester examination. A student will be eligible for this concession at most in two semesters during the entire degree programme. Application for medical leave, supported by medical certificate with endorsement by a Registered Medical Officer, should reach the HOD within seven days after returning from leave or, on or before the last instructional day of the semester, whichever is earlier.

13.3 As an incentive to those students who are involved in extra curricular activities such as representing the University in Sports and Games, Cultural Festivals, and Technical Festivals, NCC/ NSS events, a relaxation of up to 10% attendance will be given subject to the condition that these students take prior approval from the officer in-charge. All such applications should be recommended by the concerned HOD and forwarded to Dean (Academic) within seven instructional days after the programme / activity.

14. Assessment Procedure
14.1. The Academic Council will decide from time to time the system of tests and examinations in each subject in each semester.

14.2 For each theory course, the assessment will be done on a continuous basis as follows:

<table>
<thead>
<tr>
<th>Test / Exam</th>
<th>Weightage</th>
<th>Duration of Test / Exam</th>
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</thead>
<tbody>
<tr>
<td>First Periodical Test</td>
<td>15%</td>
<td>1 Period</td>
</tr>
<tr>
<td>Second Periodical Test</td>
<td>15%</td>
<td>1 Period</td>
</tr>
<tr>
<td>Third Periodical Test</td>
<td>20%</td>
<td>2 Periods</td>
</tr>
<tr>
<td>End – semester examination</td>
<td>50%</td>
<td>3 Hours</td>
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</table>

14.3 For practical courses, the assessment will be done by the subject teachers as below:

(i) Weekly assignment/Observation note book / lab records – weightage 60%.
(ii) End semester examination of 3 hours duration including viva – weightage 40%.

14.4 For courses on Physical Education, NSS, etc the assessment will be as satisfactory/not satisfactory only.

15. Make up Examination/Periodical Test

15.1. Students who miss the end-semester examinations / periodical test for valid reasons are eligible for make-up examination /periodical test. Those who miss the end-semester examination / periodical test should apply to the Head of the Department concerned within five days after he/she missed examination, giving reasons for absence.

15.2. Permission to appear for make-up examination/periodical test will be given under exceptional circumstances such as admission to a hospital due to illness. Students should produce a medical certificate issued by a Registered Medical Practitioner certifying that he/she was admitted to hospital during the period of examination / periodical test and the same should be duly endorsed by parent/guardian and also by a medical officer of the University within 5 days.

15.3. The student will be allowed to make up at the most two out of three periodical tests and end – semester examination.

16. Project evaluation

16.1 For Project work, the assessment will be done on a continuous basis as follows:

<table>
<thead>
<tr>
<th>Review / Exam</th>
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<td>First Review</td>
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<tr>
<td>Second Review</td>
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<tr>
<td>Third Review</td>
<td>20%</td>
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<tr>
<td>End - semester Exam</td>
<td>50%</td>
</tr>
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</table>

For end – semester exam, the student will submit a Project Report in a format specified by the Dean (Academic). The first three reviews will be conducted by a Committee constituted by the Head of the Department. The end – semester examination will be conducted by a Committee constituted by the Registrar / Controller of examination. This will include an external expert.

17. Declaration of results

17.1 A candidate who secures not less than 50% of total marks prescribed for a course with a minimum of 50% of the marks prescribed for the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

17.2 After the valuation of the answer scripts, the tabulated results are to be scrutinized by the Result Passing Boards of UG and PG programmes constituted by the Vice-Chancellor. The recommenda- tions of the Result Passing
Boards will be placed before the Standing Sub Committee of the Academic Council constituted by the Chancellor for scrutiny. The minutes of the Standing Sub Committee along with the results are to be placed before the Vice-Chancellor for approval. After getting the approval of the Vice-Chancellor, the results will be published by the Controller of Examinations.

17.3 If a candidate fails to secure a pass in a course due to not satisfying the minimum requirement in the end semester examination, he/she shall register and re-appear for the end semester examination during the following semester. However, the internal marks secured by the candidate will be retained for all such attempts.

17.4 If a candidate fails to secure a pass in a course due to insufficient sessional marks though meeting the minimum requirements of the end semester examination, wishes to improve on his/her sessional marks, he/she will have to register for the particular course and attend the course with permission of the HOD concerned and Dean with a copy marked to the Registrar. The sessional and external marks obtained by the candidate in this case will replace the earlier result.

17.5 A candidate can apply for the revaluation of his/her end semester examination answer paper in a theory course within 2 weeks from the declaration of the results, on payment of a prescribed fee through proper application to the Registrar/Controller of Examinations through the Head of the Department. The Registrar/Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

18. Grade Card

18.1 After results are declared, grade sheet will be issued to each student which will contain the following details:

(i) Program and branch for which the student has enrolled.
(ii) Semester of registration.
(iii) List of courses registered during the semester and the grade scored.
(iv) Semester Grade Point Average (GPA)
(v) Cumulative Grade Point Average (CGPA).

19. Class/Division

Classification is based on CGPA and is as follows:
CGPA≥8.0: First Class with distinction
6.5 ≥CGPA < 8.0: First Class
5.0 ≥CGPA < 6.5: Second Class.

20. Transfer of credits

20.1. Within the broad framework of these regulations, the Academic Council, based on the recommendation of the transfer of credits committee so consulted by the Chancellor may permit students to earn part of the credit requirement in other approved institutions of repute and status in the country or abroad.

20.2 The Academic Council may also approve admission of lateral entry (who hold a diploma in Engineering/technology) candidates with advance credit based on the recommendation of the transfer of credits committee on a case to case basis.

21. Eligibility for the award of B.E. / B.Tech. Degree

21.1. A student will be declared to be eligible for the award of the B.E. / B.Tech. Degree if he/she has
i) registered and successfully credited all the core courses;
ii) successfully acquired the credits in the different categories as specified in the
curriculum corresponding to the discipline (branch) of his/her study within the stipulated time;
iii) has no dues to all sections of the Institute including Hostels, and
iv) has no disciplinary action pending against him/her.

The award of the degree must be recommended by the Academic Council and approved by the Board of Management of the University.

22. Change of Branch

22.1 If the number of students in any branch of B.E. / B.Tech. class as on the last instructional day of the First Semester is less than the sanctioned strength, then the vacancies in the said branches can be filled by transferring students from other branches. All such transfers will be allowed on the basis of merit of the students. The decision of the Chancellor shall be final while considering such requests.

22.2 All students who have successfully completed the first semester of the course will be eligible for consideration for change of branch subject to the availability of vacancies.

23. Power to modify

23.1. Notwithstanding all that has been stated above, the Academic Council shall modify any of the above regulations from time to time subject to approval by the Board of Management.
# B.E. AUTOMOBILE ENGINEERING
## CURRICULUM
### SEMESTER - I (Common to All Branches)

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# To be decided by the department

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# To be decided based on Semester - I by the Department

* Common to All Branches
$ Common to All Branches except IT
** Common to all branches Except CSE, IT & Mech
*** Common to Aero, Auto, Civil, EEE,EIE & Mech
### SEMESTER III

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* Common to All Branches  
** Common to Aero, Auto & Mech.

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*** Common to Aero & Auto  
# Common to all branches except CSE
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* Common to Auto & Mech

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* Common to All Branches
** Common to Auto & Mech
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* Common to All Branches  
** Common to Aero, Auto, Civil & Mech

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* Common to all branches  
Total Credits = 186
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* Common to Auto & Mech
** Common to Auto, EEE & Mech
*** Common to Aero, Auto & Mech

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* Common to Auto & Mech
SEMESTER – I
EL 1101 ENGLISH - I
(Common to All Branches)

AIM:
- To encourage engineering students with different backgrounds to actively take part in learning and using the English language in their day to day communication activities

OBJECTIVES:
- To help students learn some important grammar components and express themselves in flawless English
- To help students to equip themselves with a sound vocabulary.
- To help students develop listening skill for academic and professional purposes
- To help students to speak English fluently
- To enable students to develop effective reading skills and develop reading habit
- To enable students to write short pieces cohesively and coherently

UNIT - I  GRAMMAR  12

Countable and uncountable nouns, The plural number, Genitive and possessive forms, Pronouns, Determiners, definite and indefinite articles, Adjectives, Main and auxiliary verbs, Transitive and intransitive, Finite and non finite verbs, Linking verbs, Regular and irregular verbs, Phrasal verbs, Infinitives and gerunds, Participles, Adverbs, Model Verbs, Comparisons, Tenses, Concord, Active and Passive voices, Direct and Indirect speeches, Conditionals, Question types, Prepositions, Conjunctions, Prefixes and Suffixes, Compound Nouns, Synonyms, Super: Ordinates and hyponyms, Expressing causal relation, Comparative adjectives, Punctuation, Use of reference words Statements, Questions,

SUGGESTED ACTIVITIES

numerical adjectives – Use of model verbs in sentences – Correction of sentences – Use of appropriate reporting verbs in indirect speech – Gap filling activity using relative pronouns – Fill in the blanks with suitable prepositions, prepositional phrases, phrasal verbs – Framing Wh – questions – ‘Yes/No’ types and question tags – Rewriting imperative sentences using ‘Should’

UNIT II LISTENING 12

Listening for general content, Listening for specific information, Listening for note making, Listening to speeches by great people and some poems.

SUGGESTED ACTIVITIES:

Listening to the text and answering questions (multiple choices, gap filling) - Listening and identifying specific information – guided and unguided note-taking – Making inferences while listening.

UNIT III SPEAKING 12

Self and peer introduction, Conversational practice in different situations, Oral presentations on various topics, Reciting speeches and poems

SUGGESTED ACTIVITIES:

Listening to English sounds and words and repeating them – Introducing self and others – Role play activities – Making presentation on given topics – describing people, objects, processes.

UNIT IV READING 12

Predicting content, Skimming text for gist, scanning for specific information, Study reading, Extensive reading.

SUGGESTED ACTIVITIES:

Taking a quick glance at the text (Skimming) and predicting the content - Reading to identify the main ideas (scanning for specific information, analyzing and interpreting data from tables and charts - sequencing of jumbled sentences using linguistics clues.

Note: Extensive reading: Students may be asked to read the books suggested for extra reading and submit assignments. Assignments can be in the form of review-criticism, appreciation etc.

UNIT V WRITING 12

Definition, Extended definition Trans coding from non verbal form to verbal form of writing. Paragraph writing, Discourse markers, Cohesion and Coherence, writing general essays, Social correspondence.
SUGGESTED ACTIVITIES:

Using appropriate expressions of defining – Writing a paragraph based on information provided in a flow charts / bar charts / tables – Writing letters of different types – Writing recommendations, Letter to Editor, Invitation, Expressing thanks etc.

TOTAL : 60

TEXT BOOKS:


REFERENCE


MA1101 – ENGINEERING MATHEMATICS - I

(Common to All Branches)

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AIM:

The course is aimed at developing the basic Mathematical skills of Engineering students that are imperative for effective understanding of Engineering subject.

OBJECTIVES:

- To identify algebraic eigenvalue problems from practical areas and obtain the eigensolutions in certain cases.
- To diagonalize a matrix which would render the eigensolution procedure very simple.
- To understand effectively the geometrical aspects of curvature, maxima and minima concept as elegant applications of differential calculus.
- To solve differential equations of certain type, that they might encounter in the same or higher
semesters.

UNIT I  MATRICES  12


UNIT II  DIFFERENTIAL CALCULUS  12

Curvature - Radius of curvature – Centre of curvature – Circle of curvature – Cartesian co-ordinates – Geometrical application of differential calculus – Evolute, Envelope – Properties of Envelope

UNIT III  ORDINARY DIFFERENTIAL EQUATIONS  12

Second order differential equations with constant coefficients – Particular integrals - Exponential - Trignometric – Algebraic functions - e αx f(x), x m Cosx,x m Sin x - Variation of parameters – Homogeneous linear second order differential equations – Simultaneous first order linear equation with constant coefficients

UNIT IV  PARTIAL DIFFERENTIATION  12


UNIT V  ANALYTICAL GEOMETRY OF THREE DIMENSIONA  12


TOTAL : 60

TEXT BOOKS


REFERENCES


PH1101 – ENGINEERING PHYSICS I

(Common to All Branches)

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AIM

To develop strong fundamentals of science for engineering applications

OBJECTIVES

- To enhance theoretical and modern technological aspects in physics.
- To enable the students to correlate the theoretical principles with application oriented studies.
- To impart fundamental knowledge in various engineering subjects and applications.

UNIT – I PROPERTIES OF MATTER


UNIT – II ACOUSTICS AND ULTRASONICS

affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies. Ultrasonics production – Magnetostriction and piezoelectric methods – properties, - applications of ultrasonics with particular reference to detection of flaws in metal (Non – Destructive testing NDT) – SONAR.

UNIT – III HEAT AND THERMODYNAMICS 12


UNIT – IV OPTICS 12


UNIT – V LASER AND FIBRE OPTICS 12


TOTAL : 60

TEXT BOOKS

REFERENCES
AIM

Upon graduation, the student will be well prepared to assume responsibilities in his/her field of specialization or continue his/her professional development through graduate studies.

OBJECTIVES

- To provide a sound fundamental knowledge of chemistry
- To instill the scientific temper and the spirit of enquiry in students
- To encourage students to understand and apply the physical laws to the development of their fields of study

UNIT I: WATER TECHNOLOGY


UNIT II: POLYMER CHEMISTRY

Related Terminology-Types of Polymers-Polymerisation Types- Mechanism of Polymerization (Free Radical Mechanism / Ionic / Co-ordination)-Thermoplastics & Thermosetting Plastics (PE, PVC, Bakelite and epoxy resins—preparation, properties and applications)-Effect of Polymer Structure on Properties- Compounding of Plastics-Molding Methods (compression moulding and injection moulding) - Polymer Composites, Blends, LCP’s -Definition, Examples and uses

UNIT III: ELECTROCHEMISTRY

Technical Terms (Definition, expressions, simple problems)-Kohlrausch law-Effect of dilution on ‘K’ and ‘Λ’ – Determination of ‘Λ’ at infinite dilution for strong electrolytes - Conductometric Titrations (four types)- Electrochemical Series- Applications-EMF Measurement (Experimental determination) - Nernst Equation (simple problems) -Types of electrodes –concentration cells-Reversible and irreversible cells - Decomposition Potential – Over-voltage
UNIT IV: CHEMICAL THERMODYNAMICS 12


UNIT V: BASIC ANALYTICAL TECHNIQUES 12


TOTAL 60

TEXT BOOKS

REFERENCES
1. B. K. Sharma, Engineering chemistry, Krishna Prakasam Media (P) Ltd., 2003
3. A. Gowarikar, Text Book of Polymer Science, 2002
4. Kuriacose & Rajaram, Vols. 1 & 2, Chemistry in Engineering and Technology, 2004
ME 1101 - ENGINEERING GRAPHICS

(Common to All Branches)

L T P C
3 0 3 4

OBJECTIVE

To develop graphic skills for communicating concepts, ideas and designs of engineering products and to give exposure to national standards relating to technical drawings.

Note: Only first angle projection is to be followed

**BASICS OF ENGINEERING GRAPHICS** 6


**UNIT - I PROJECTION OF POINTS, LINES AND SURFACES** 15

General principles of presentation of technical drawings as per BIS – Introduction to Orthographic projection - Naming views as per BIS – First angle projection. Projection of points. Projection of straight lines located in first quadrant only. Projection of plane surfaces like polygonal lamina and circular lamina. Drawing views when the surface of the lamina is inclined to one reference plane.

**UNIT - II PROJECTION OF SOLIDS** 15

Projections of simple solids like prism, pyramid, cylinder and cone – Drawing views when the axis of the solid is inclined to one reference plane.

**UNIT - III SECTION OF SOLIDS AND DEVELOPMENT** 15

Sectioning of simple solids like prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

**UNIT - IV ORTHOGRAPHIC PROJECTIONS** 15

Orthographic projections – Conversion of orthographic views from given pictorial views of objects, including dimensioning. Free hand sketching of Orthographic views from Pictorial views.

**UNIT - V PICTORIAL PROJECTIONS** 15

Isometric projection – Isometric scale – Isometric views of simple solids like prisms, pyramids, cylinders and cones. Perspective projection of simple solids like cube, prisms and pyramids.

**COMPUTER AIDED DRAFTING (Demonstration Only)** 9

Introduction to computer aided drafting and dimensioning using appropriate software.
2D drawing commands Zoom, Picture editing commands, Dimensioning, Isometric drawing, Iso-Planes and 3D drafting. Plotting of drawing. Practice includes drawing the projection of lines and solids. Prepare isometric view of simple solids like prisms, pyramids, cylinders and cones.

**TOTAL : 90**

**TEXT BOOKS:**


**REFERENCES**

6. IS 10711 - 2001 Technical Product Documentation - Sizes of drawing sheets
7. IS 9609 - 1983 Lettering on Technical Drawings
8. IS 10714 - 1983 General Principles of Presentation of Technical Drawings
9. IS 11669 - 1986 General Principles of Dimensioning of Technical Drawings
CS1101- COMPUTER PROGRAMMING
(Common to All Branches)

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**AIM**

To impart knowledge to analyze, solve, design and code real life problems using C and C++ languages.

**OBJECTIVES**

- To enable the student to learn the major Components of a Computer System.
- To learn the basic concepts of computing.
- To know the methodology of problem solving.
- To develop skills in programming using C and C++ languages.
- To learn the object oriented concepts.

**OUTCOME**

The students will be ready to develop programs to solve any kind of problems.

**UNIT - I  INTRODUCTION TO COMPUTING**


**UNIT - II  INTRODUCTION TO C**


**UNIT - III  ARRAYS, STRUCTURES AND FUNCTIONS**

Arrays – Handling of Character Strings – User-Defined data types and user defined functions-Structures–Union–Nested structure, passing structures to functions - Self referential structures.

**UNIT - IV  POINTERS AND FILE HANDLING**

Pointer concept–Declaration–Accessing variable through pointer–Initializing pointer variable–
Points and Functions–Pointers and Arrays–Pointers and Structures–Example programs using
pointers with function, arrays and structures–Command line arguments – Dynamic memory
allocation–Operations on pointers.

File pointer–High level File operations–Opening and closing of file–Creating, Processing and
Updating on files–Random access file-Simple file handling programs.

UNIT - V    INTRODUCTION TO OBJECT ORIENTED PROGRAMMING IN C++      12

Introduction to object oriented paradigm – Merits and demerits of OO Methodology - Classes
and Objects - Virtual Functions and Polymorphism and Inheritance - Introduction to Class Access or
Methods - Constructors and Destructors - Function overloading and operator overloading - Arrays
and String Classes – Inheritance. Simple programs using C++.

TOTAL : 60

TEXT BOOKS

1. ITL Education Solutions Limited, Introduction to Information Technology, Pearson Education
   Inc. (2005)(Unit I)

REFERENCES


CS 1131 - COMPUTER PROGRAMMING LABORATORY
(Common to All Branches)

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AIM

To provide an awareness to develop the programming skills using computer languages.

OBJECTIVES

法人 To learn to program in C.
法人 To learn the object oriented basic concepts.
To learn to program in C++.

LIST OF EXPERIMENTS:

PROGRAMMING IN C:

1. To write a C program to prepare the electricity bill.

2. * Functions:
   (a) Call by value  (b) Call by reference.

3. To write a C program to print the Fibonacci series for the given number.

4. To write a C program to find the factorial of number using recursion.

5. To write a C program to implement the basic arithmetic operations using Switch Case statement.

6. To write a C program to check whether the given number is an Armstrong number.

7. To write a C program to check whether the given string is a Palindrome.

8. To write a C program to create students details using Structures.

9. To write a C program to demonstrate the Command Line Arguments.

10. To write a C program to implement the Random Access in Files.

11. To write C programs to solve some of the Engineering applications.

PROGRAMMING IN C++

12. To write a C++ program to explain the Stack operation.

13. To write a C++ program to implement the Queue operation.

14. Templates: (a) Function templates. (b) Class templates.

15. Overloading: (a) Operator overloading (b) Function overloading

   To write a C++ program using Inheritance concepts.

   TOTAL : 45
GE 1101 - ENGINEERING PRACTICES LABORATORY
(Common to All Branches)

OBJECTIVE

To provide experience to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

LIST OF EXPERIMENTS

1. MECHANICAL ENGINEERING PRACTICE 15

   1. Welding
      Preparation of arc welding of butt joints and lap joints
   
   2. Basic Machining
      Simple turning and drilling practices using lathe.
   
   3. Machine assembly practice
      Study of centrifugal pump
   
   4. Demonstration on
      a. Smithy operations - Productions of hexagonal headed bolt.
   

2. CIVIL ENGINEERING 12

   1. Basic pipe connection using valves, couplings, unions, reducers, elbows used in household fitting.
   
   2. Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.
   
   3. Wood work: Sawing, Planning and making common joints.
   
   4. Study of joints in door panels and wooden furniture.

3. ELECTRICAL ENGINEERING 9

   1. Wiring for tube light.
   
   2. Wiring for lamp and fan.

**4. ELECTRONICS ENGINEERING**

1. (a) Study of Electronic components and Equipments.
2. Characteristics of PN junction diode & measurement of Ripple factor of half wave and full wave rectifier.
3. Applications of OP-AMP – Inverter, Adder and Subtractor.
4. Study and verification of Logic Gates.

**TEXT BOOK**


**GE 1102 – PHYSICAL SCIENCES LABORATORY**

*(Common to All Branches)*

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**PHYSICS LABORATORY**

**LIST OF EXPERIMENTS**

1. Torsional Pendulum – Determination of rigidity Modulus of the material of a wire.
5. Air wedge – Determination of thickness of a thin wire.
6. Spectrometer - Refractive index of a prism.
CHEMISTRY LABORATORY

LIST OF EXPERIMENTS

1. Weighing and preparation of standard solutions – Preparation of molar and normal solutions of the following substances – oxalic acid, sodium hydroxide and hydrochloric acid
2. Estimation of Commercial soda by acid-base titration
3. Determination of Percentage of nickel in an alloy
4. Determination of Temporary, permanent and total hardness of water by EDTA method
5. Determination of Chloride content in a water sample
6. Potentiometric Estimation of iron
7. Conductometric Titration of a strong acid with a strong base
8. Determination of Degree of polymerization of a polymer by Viscometry

TOTAL : 45

REFERENCES

Objectives

- To provide practice in realizing the meaning potential of a text and to make the learners become familiar with different reading strategies
- To help learners acquire interpretative and study skills, including library and Internet reference skills
- To train learners in organized academic and professional writing
- To develop oral competence and oral fluency of learners
- To help learners achieve proficiency in the effective use of language in various authentic career-related situations

UNIT - I


Activities Suggested:

- Guessing meaning for contexts while reading
- Pick out reference words from paragraphs
- Order jumbled sentences
- Order jumbled paragraphs
- Punctuating passages
- Fill in blanks using prepositions
- Writing letters expressing thanks
- Writing complement letters to editor of a newspaper
- Writing one sentence definition
- Writing extended definition
UNIT - II

Vocabulary Development – scanning and study reading – Use of numerical expressions as adjectives – Expressing suggestions – Expressing explanation – Yes/no question formations and discussion – Listening comprehension - Description of things and events.

Activities Suggested:

- Matching words with meanings
- Formation of words using prefixes and suffixes
- Read and answer comprehension questions
- Hold short group discussions
- Expand numerical expression
- Write description of objects and events
- Write letters expressing suggestions
- Role-plays

UNIT - III


Activities Suggested:

- Making summary of a passage
- Listen to instructions and write a description
- Combine sentences using connectives to show cause and effect ( eg., so as to, because of, as result of etc…)
- Design an advertisement for promotion of sale of a particular item
- Write an application letter
- Prepare a resume
- Writing an argument for a cause
- Stating solution for a problem

UNIT - IV

Present perfect continuous – Use of ‘should’, ‘ought’ – Listening to a talk to know the gist - Describing a scenery – Use of as soon as, no sooner than, though, in spite of – Expressing certainty, probability, possibility, impossibility – Use of modal verbs – Use of phrases and idioms –
simple past and past perfect – Use of infinitives – Writing memos and circulars- Report writing.

**Activities Suggested:**

- Changing instructions to suggestions
- Listening to a talk and write summary
- Preparing a travel itinerary
- Writing a travelogue
- Rewriting sentences using modal verbs
- Rewrite sentences using as soon as, no sooner than, though, in spite of etc…
- Prepare memos and circulars
- Hold discussions and write reports based on the discussions

**UNIT - V**

Meanings of words – Use of conditionals – Expressing futurity – Direct and Indirect speech – Essay writing

**Activities Suggested:**

- Holding interviews
- Role-plays
- Complete sentences using conditionals
- Expressing fears and hopes
- Write short essays for given topics

**Total: 60**

**TEXT BOOK**

*Learning to Communicate, A Resource book for Scientists and Technologists* –

Dr. V. Chellamal., Allied Publishers.

Units 5 to 10

**Extensive Reading:**


**Note:**

Extensive reading is not for testing. Regular assignments have to be submitted by the students.
REFERENCES:

MA 1102 – ENGINEERING MATHEMATICS – II
(Common to All Branches)

L T P C
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OBJECTIVES

On completion of the course the students are expected to

• Have learnt the methods of double and triple integration, which are needed in their studies in other areas, and gained confidence to handle integrals of higher orders.

• Have studied the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them, which would be encountered by them in their engineering subjects in the same or higher semesters.

• Have a good grasp of analytic functions and their interesting properties which could be exploited in a few engineering areas, and be introduced to the host of conformal mappings with a few standard examples that have direct application.

• Have grasped the basics of complex integration and the concept of contour integration which is an important tool for evaluation of certain integrals encountered in practice.

• Have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform technique which have applications in other subjects of the current and higher semesters

UNIT – I: Multiple Integrals


UNIT – II: Vector Calculus

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s
theorem (excluding proof) – Simple applications.

UNIT – III:  Analytic functions  

Functions of a complex variable – Analytic function – Necessary conditions – Cauchy – Riemann equations – Sufficient conditions (excluding proof) – Properties of analytic function – Harmonic conjugate – Construction of Analytic functions – Conformal mapping - w = z + a, az, 1/z and bilinear transformation.

UNIT – IV:  Complex integration  

Statement and application of Cauchy’s integral theorem and integral formula – Taylor and Laurent expansions – Isolated singularities – Residues – Cauchy’s residue theorem. Contour integration over unit circle and semicircular contours (excluding poles on boundaries).

UNIT – V:  Laplace Transform  


Inverse Laplace transform – Convolution theorem – Solution of linear ODE of second order with constant coefficient and first order simultaneous equations with constant coefficient using Laplace transform.

Total: 60

TEXT BOOKS:

REFERENCES:
PH 1102 – ENGINEERING PHYSICS – II
(Common to All Branches except IT)

L T P C
3 1 0 4

OBJECTIVES

At the end of the course the students would be exposed to fundamental knowledge in

- Structure identification of engineering materials.
- Non-destructive techniques.
- Application of quantum physics to electrical phenomena.
- Conducting and Semi conducting materials.
- Modern Engineering materials and Superconducting materials.

UNIT – I: Crystal Physics and Non-Destructive Testing 12

Crystal Physics: Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – ‘d’ spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius - coordination number – Packing factor for SC, BCC, FCC and HCP structures.


UNIT – II: Quantum Physics 12

Black body radiation – Planck’s theory (derivation) – Deduction of Wien’s displacement law and Rayleigh – Jeans’ law from Planck’s theory – Compton effect – Theory and experimental verification – Schroedinger’s wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box Extension to 3 dimension (no derivation).

UNIT – III: Conducting Materials 12


UNIT – IV: **Semi conducting Materials**  

Intrinsic Semi-conductors: Carrier concentration in an intrinsic semiconductor – Calculation of density of holes and electrons – Fermi level and its variation with temperature – Mobility and conductivity – Determination of band gap.

Extrinsic Semiconductors: Expression for carrier concentration in n–type and p–type semiconductors – Variation of Fermi level with temperature and impurity concentration - Hall Effect determination of Hall coefficient.

UNIT – V: **Modern Engineering Materials and Superconducting Materials**  

Modern Engineering Materials:

Metallic glasses: Preparation properties and applications

Shape memory alloys (SMA): Characteristics, applications, advantages and disadvantages of SMA.

Nano Materials: Synthesis – Properties and applications

Superconducting Material: Superconducting phenomena – Properties of superconductors – Meissner effect – Type I and Type II superconductors – High Tc superconductors (qualitative) – use of superconductors.

**Total: 60**

**TEXT BOOKS:**

3. P. Charles, Poople and Frank J. Owens., Introduction to Nanotechnology, Wiley India, 2007 for Unit V.

**REFERENCES:**

OBJECTIVES

Students should be conversant with

- Properties and applications of fossil fuels and combustion calculations.
- Machinery related materials, industrial furnaces and boiler chemistry
- Powder metallurgy and phase equilibria involving condensed systems.
- Quantitative techniques involving gravimetry and instrumental methods.

UNIT - I: CORROSION AND ITS CONTROL


UNIT - II: ENGINEERING MATERIALS


UNIT - III: FUELS AND COMBUSTION

UNIT - IV:  SPECIALITY MATERIALS


UNIT - V:  ENERGY SOURCES


Total: 60

TEXT BOOKS


REFERENCES


ME1102 ENGINEERING MECHANICS
(Common to Aero, Auto, Civil, EEE, EIE & Mech)

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3 1 0 4

OBJECTIVE

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT – I : BASICS & STATICS OF PARTICLES


UNIT – II : EQUILIBRIUM OF RIGID BODIES


UNIT – III : FRICTION


UNIT – IV : PROPERTIES OF SURFACES AND SOLIDS

UNIT – V: DYNAMICS OF PARTICLES


TOTAL : 60

Text Books:

References :

AT 1101 - PRODUCTION TECHNOLOGY

OBJECTIVE

The automobile components such as piston, connecting rod, crankshaft, engine block, front axle, frame, body etc., are manufactured by various types of production processes involving casting, welding, machining, metal forming, power metallurgy etc. Hence B.E. Automobile Engineering students must study this course Production Technology.

UNIT I: CASTING

Casting types, procedure to make sand mould, types of core making, moulding rolls, machine moulding, special moulding processes – CO2 moulding; shell moulding, investment moulding, permanent mould casting, pressure die casting, centrifugal casting, continuous casting, casting defects.
UNIT II: WELDING


UNIT III: MACHINING

General principles (with schematic diagrams only) of working and commonly performed operations in the following machines: Lathe, Shaper, Planer, Horizontal milling machine, Universal drilling machine, cylindrical grinding machine, Capstan and Turret lathe. Basics of CNC machines. General principles and applications of the following processes: Abrasive jet machining, Ultrasonic machining, Electric discharge machining, Electro chemical machining, Plasma arc machining, Electron beam machining and Laser beam machining.

UNIT IV: FORMING AND SHAPING OF PLASTICS


UNIT V: METAL FORMING AND POWDER METALLURGY

Principles and applications of the following processes: Forging, Rolling, Extrusion, Wire drawing and Spinning, Powder metallurgy – Principal steps involved advantages, disadvantages and limitations of powder metallurgy.

Total: 45

TEXT BOOK


REFERENCES

LIST OF EXPERIMENTS

1. Mechanical Engineering
   1. Welding
      Preparation of arc welding of butt joints and lap joints
   2. Basic Machining
      Simple Turning and Drilling practice.
   3. Machine assembly practice
      Stud of centrifugal pump
   4. Demonstration on
      a. Smith operations- Production of hexagonal headed bolt.
      b. Foundry operations – mould preparation for gear and step cone pulley.

2. Civil Engineering
   1. Basic pipe connection using valves, couplings, unions, reducers, elbows in household fitting.
   2. Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.
   3. Wood work: Sawing, Planing and making common joints.
   4. Study of joints in door panels, wooden furniture.

3. Electrical Engineering
   1. Wiring for a tube light.
   2. Wiring for a lamp and fan.
   4. Study of (i) Iron box and (ii) Fan with Regulator.

4. Electronics Engineering
   1. (a) Study of Electronic components and Equipments.
   2. Characteristics of PN junction diode & measurement of Ripple factor of half wave and full wave rectifier.
   3. Applications of OP-AMP – Inverter, Adder and Subtractor.
   4. Study and verification of Logic Gates.
TEXT BOOK:


GE 1102 – PHYSICAL SCIENCES LABORATORY

(Common to All Branches)

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PHYSICS LABORATORY

List of Experiments

1. Torsional Pendulum – Determination of rigidity Modulus of the material of a wire.
5. Air wedge – Determination of thickness of a thin wire.
6. Spectrometer - Refractive index of a prism.

CHEMISTRY LABORATORY

List of Experiments

1. Weighing and preparation of standard solutions - Preparation of molar and normal solutions of the following substances-oxalic acid, sodium hydroxide and hydrochloric acid.
2. Estimation of Commercial soda by acid-base titration
3. Determination of Percentage of nickel in an alloy
4. Determination of Temporary, permanent and total hardness of water by EDT A method
5. Determination of Chloride content in a water sample
6. Potentiometric Estimation of iron
7. Conductometric Titration of strong acid with a strong base
8. Determination of Degree of polymerization of a polymer by Viscometry
REFERENCES


AT 1102 - PRODUCTION TECHNOLOGY LABORATORY

OBJECTIVE:

To gain a practical knowledge of production processes such as turning, facing, thread cutting, drilling, boring, knurling, shaping, milling, cylindrical grinding etc., which are involved in the manufacturing of various automobile components.

Exercise in Lathe, Shaper, Planer, Milling and Grinding machine in the following machining operations.

1. LATHE

1.1. Facing, plain turning and step turning

1.2 Taper turning using compound rest.

1.3. Taper turning using taper turning attachment

1.4. Single start V thread, cutting and knurling

1.5. Boring and internal thread cutting.

2. SHAPER AND SLOTTER

2.1. Machining a V- block (in a Shaper)

2.2. Machining hexagonal shape (in a Shaper)

2.3. Machining internal key-way (in a slotter)

3. DRILLING

3.1. Drilling 4 or 6 holes at a given pitch circle on a plate
3.2. Drilling, reaming and tapping

4. MILLING

4.1. Plain Milling Exercise

4.2. Gear Milling Exercise

5. GRINDING

   Cylindrical Grinding Exercise

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

1. Centre Lathe with accessories
   (At least four lathes must have tape-turning attachment) 15 No.


5. Upright Drilling Machine - 1 No.


SEMESTER – III
MA1203 – ENGINEERING MATHEMATICS – III
(Common to All Branches)

L T P C
3 1 0 4

OBJECTIVES
1. To provide a strong basic knowledge on solving partial differential equations.
2. To understand Fourier series and various boundary conditions.
3. To have a strong knowledge of second order linear partial differential equations, one dimensional wave and heat equations, two dimensional heat equations.
4. To have a sound knowledge of Fourier transform and its properties.

UNIT – I: Partial Differential Equations 12
Formation of partial differential equation differential equations by elimination arbitrary constant arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT – II: Fourier series 12

UNIT – III: Boundary Value Problems 12
Classification of second order linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two dimensional heat equations (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT – IV: Fourier Transform 12

UNIT – V: Z – Transform and Difference Equations 12

Total: 60
TEXT BOOKS:

REFERENCES:

ME 1202 - FLUID MECHANICS AND MACHINERY
(Common to Aero, Auto, Mech.)

OBJECTIVES
- To understand the structure and the properties of the fluid.
- To understand and appreciate the complexities involved in solving the fluid flow problems.
- To understand the mathematical techniques already in vogue and apply them to the solutions of practical flow problems.
- To understand the energy exchange process in fluid mechanics handling incompressible fluids.

UNIT - I: BASIC CONCEPTS AND PROPERTIES
Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension - Fluid statics- concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers and pressure gauges.

UNIT -II: FLUID KINEMATICS AND FLUID DYNAMICS
Fluid Kinematics - Flow visualization - lines of flow - types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- Equation of streamline - stream function - velocity potential function - circulation - flow net – fluid dynamics - equations of motion - Euler’s equation along a streamline - Bernoulli’s equation – applications - Venturi meter, Orifice meter, Pitot tube - dimensional analysis - Buckingham’s ε theorem- applications - similarity laws and models.
UNIT - III: INCOMPRESSIBLE FLUID FLOW

Viscous flow - Navier - Stoke’s equation (Statement only) - Shear stress, pressure gradient relationship - laminar flow between parallel plates - Laminar flow through circular tubes (Hagen poiseulle’s)- Hydraulic and energy gradient - flow through pipes - Darcy - weisback’s equation - pipe roughness -friction factor - Moody’s diagram-minor losses - flow through pipes in series and in parallel - power transmission - Boundary layer flows, boundary layer thickness, boundary layer separation - drag and lift coefficients.

UNIT - IV: HYDRAULIC TURBINES

Fluid machines, definition and classification - exchange of energy - Euler’s equation for turbo machines - Construction of velocity vector diagram’s - head and specific work - components of energy transfer - degree of reaction.


UNIT - V: HYDRAULIC PUMPS

Pumps: definition and classifications - Centrifugal pump: classifications, working principles, velocity triangles, specific speed, efficiency and performance curves - Reciprocating pump: classification, working principles, indicator diagram, work saved by air vessels and performance curves - cavitations in pumps - rotary pumps: working principles of gear and vane pumps

Total: 60

TEXT BOOKS


REFERENCES

EE 1215 - BASIC ELECTRICAL TECHNOLOGY

OBJECTIVE

To expose the students to the fundamental of electrical circuits, principles of operation of D.C. & A.C. machines, measurements and measuring instruments.

UNIT - I: FUNDAMENTALS OF D.C AND A.C CIRCUITS 12


UNIT - II: D.C AND A.C MACHINES 12

Constructional details and operating principles of D.C generators – e.m.f equation – type of generators – O.C.C. and load characteristics – principle and operation of D.C motors – back e.m.f. – types of motors – speed and torque equation – load characteristics of D.C motors – starting methods. Construction and operation of synchronous generators – types of synchronous machines – e.m.f equation – load characteristics – principle of operation of synchronous motors – starting methods – simple problems-starter motors for automotive applications.

UNIT - III: TRANSFORMERS 12


UNIT - IV: INDUCTION MACHINES 12

UNIT -V: MEASUREMENTS AND MEASURING INSTRUMENTS 12

Deflecting torque, controlling torque and damping torque in indicating instruments - construction and operating principles of moving coil and moving iron instruments – voltmeters and ammeters – construction and operating principles of induction type energy meters and dynamo meter type wattmeters – types of errors.

Total: 60

TEXT BOOKS

REFERENCES

AT 1201 - APPLIED THERMODYNAMICS

OBJECTIVE
On completion of this course, the students are exposed to understand the concept of various power cycles and their applications, steam generators and their performance evaluation, types of fuels and the process of combustion.

UNIT - I: FIRST LAW OF THERMODYNAMICS 12

System, thermodynamic equilibrium, state, property, process, cycle, zeroth law of thermodynamics, energy, work, heat, first law of thermodynamics, PMM I, 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.

UNIT - II: SECOND LAW OF THERMODYNAMICS 12

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

**UNIT - III: GAS POWER CYCLES, FLUID FLOW AND VAPOUR POWER CYCLE 12**

Air standard Brayton cycle with intercooling, reheating and regeneration properties of steam, one dimensional steady flow of gases and steam through nozzles and diffusers, Rankine cycle.

**UNIT - IV: RECIPROCATING AIR COMPRESSORS, REFRIGERATION CYCLES 12**

Single acting and double acting air compressors, work required, effect of clearance volume, volumetric efficiency, isothermal efficiency, free air delivery, multistage compression, condition for minimum work. Fundamentals of refrigeration, C.O.P., reversed Carnot cycle, simple vapour compression refrigeration system, T-S, P-H diagrams, simple vapour absorption refrigeration system, desirable properties of an ideal refrigerant.

**UNIT - V: FUNDAMENTALS OF HEAT TRANSFER 12**

Modes of heat transfer, Fourier’s law of conduction, one dimensional steady state conduction through plane and composite walls, cylinders and spheres. Free and forced convection, dimensionless numbers, thermal boundary layer, heat transfer co-efficient, simple problems in fins, heat transfer between fluids separated by plane and cylindrical walls, overall heat transfer coefficient, heat exchangers, LMTD, concept of radiation- Planck’s law, Wien’s displacement law, Stefan Boltzmann law, Black body and Grey body radiation.

Total: 60

**TEXT BOOKS**


**REFERENCES**

AT 1202 - AUTOMOTIVE PETROL ENGINES

L T P C
3 0 0 3

OBJECTIVE

To learn the fundamental principles, construction and auxiliary systems of automotive petrol engines.

UNIT - I: ENGINE CONSTRUCTION AND OPERATION 9

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.

UNIT - II: SI ENGINE FUEL SYSTEM 9

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. Petrol injection, MPFI.

UNIT - III: IGNITION SYSTEM 9

Types and working of battery coil and magneto ignition systems, relative merits and demerits, centrifugal and vacuum advance mechanisms. Types and construction of spark plugs, electronic ignition systems.

UNIT - IV: COOLING AND LUBRICATION SYSTEM 9

Need for cooling system, Types of cooling system: air cooling system, liquid cooling system, forced circulation system, pressure cooling system. Lubrication system; mist, wet sump lubrication system, properties of lubricants.

UNIT - V: COMBUSTION AND COMBUSTION CHAMBERS 9

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.

Total: 45

TEXT BOOKS


REFERENCES

AT 1203 - AUTOMOTIVE DIESEL ENGINES

OBJECTIVE
To study and understand the principles involved in design, construction of diesel engines and its components.

UNIT - I: BASIC THEORY
Diesel engine construction and operation, two stroke and four stroke diesel dual cycle engines, diesel cycle, fuel-air and actual cycle analysis, diesel fuel, ignition quality, certain number, laboratory tests for diesel fuels, standards and specifications.

UNIT - II: FUEL INJECTION SYSTEM
Requirements, air and solid injection, functions of components, jerk and distributor type pumps common rail system, PTFI system pressure waves, injection lag, unit injector, mechanical and pneumatic governors, fuel injector, types of injection nozzle, nozzle tests, spray characteristics, injection timing, pump calibration.

UNIT - III: AIR MOTION, COMBUSTION AND COMBUSTION CHAMBERS
Importance of air motion, swirl, squish and turbulence, swirl ratio, fuel air mixing, stages of combustion, delay period, factors affecting delay period, knock in CI engines. Combustion chamber: design requirements, direct and indirect injection combustion chambers, M type combustion chamber.
UNIT - IV: SUPERCHARGING AND TURBOCHARGING

Necessity and limitations, types of supercharging and turbo charging, relative merits, matching of turbocharger, exhaust gas recirculation, charge cooling.

UNIT - V: DIESEL ENGINE TESTING AND PERFORMANCE


Total: 45

TEXT BOOKS

REFERENCES

AT 1221 - FUELS AND LUBRICANTS LABORATORY

L T P C
0 0 3 1

LIST OF EXPERIMENTS
1. Temperature dependence of viscosity of lubrication oil by Redwood viscometer.
2. Viscosity index of lubricating oil by Say bolt viscometer
3. Flash and fire points of fuels.
4. Flash and fire points of lubricants.
5. ASTM distillation test of gasoline
6. Drop point of grease and Mechanical penetration in grease.
7. Aniline distillation test of gasoline
8. Reid vapor pressure test.
9. Study of Bomb Calorimeter.
10. Study of Gas Calorimeter.

LIST OF EQUIPMENTS - Each 1 No

(For a batch of 30 students)

1. Redwood Viscometer
2. Say bolt Viscometer
3. Flash and Fire point apparatus
4. ASTM distillation test apparatus
5. Mechanical penetration apparatus for grease
6. Aniline distillation test apparatus
7. Reid vapor pressure test apparatus
8. Drop point of grease apparatus
9. Bomb Calorimeter
10. Gas Calorimeter

AT 1222 - FLUID MECHANICS AND MACHINERY

LABORATORY

L T P C
0 0 3 1

LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of given Orifice meter.
2. Determination of the Coefficient of discharge of given Venturi meter.
3. Calculation of the rate of flow using Rotameter.
4. Determination of friction factor of given set of pipes.
5. Conducting experiments and drawing the characteristic curves of centrifugal pump / submergible pump
6. Conducting experiments and drawing the characteristic curves of reciprocating pump.
7. Conducting experiments and drawing the characteristic curves of Gear pump.
8. Conducting experiments and drawing the characteristic curves of Pelton wheel.
9. Conducting experiments and drawing the characteristics curves of Francis turbine.
10. Conducting experiments and drawing the characteristic curves of Kaplan turbine.

LIST OF EQUIPMENT
(For the batch of 30 students)

1. Orifice meter setup
2. Venturi meter setup
3. Rotameter setup
4. Pipe Flow analysis setup
5. Centrifugal pump/submersible pump setup
6. Reciprocating pump setup
7. Gear pump setup
8. Pelton wheel setup
9. Francis turbine setup Kaplan turbine setup

AT 1223 - AUTOMOTIVE ENGINE COMPONENTS
LABORATORY

L T P C
0 0 3 1

LIST OF EXPERIMENTS

1. Dismantling of 4 cylinder petrol engine.
3. Dismantling of 6 cylinder diesel engine.
5. Study of oil filter, fuel filter, fuel injection system, carburetor, MPFI
6. Study of ignition system components – coil, magneto and electronic ignition systems.
7. Study of engine cooling system components
8. Study of engine lubrication system components
9. Ovality and taper measurement of cylinder bore and comparison with standard specifications
10. Ovality and taper measurement of engine crank shaft and comparison with standard specification

LIST OF EQUIPMENTS - Each 1 No

(For a batch of 30 students)

1. Four cylinder petrol engine
2. Six cylinder diesel engine
3. Fuel filter, fuel injection pump, injector, carburetor, MPFI component
4. Ignition coil, magneto, electronic ignition system components
5. Water pump, thermostat, radiator, temperature gauge
6. Lub oil pump, pressure relief valve, filter, oil pressure gauge
7. Internal micrometer, external micrometer, dial gauges.
OBJECTIVES:
With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving numerically different kinds of problems in engineering. At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS

UNIT II INTERPOLATION
Lagrangian Polynomials – Divided difference – Interpolation with a cubic spline – Newton forward and backward difference formulæ.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION
Derivatives from difference table – Divided difference and finite difference – Numerical integration by Trapezoidal and Simpson’s 1/3 and 3/1 rules – Romberg’s method – Two and three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpson’s rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

UNIT V BOUNDARY VALUE PROBLEMS
Finite difference solution for the second order ordinary differential equations. Finite difference solution for one dimensional heat equation by implicit and explicit methods – one dimensional wave equation and two dimensional Laplace and Poisson equations.

TEXT BOOKS:
2. S. Arumugam, “Numerical Methods for Engineers”,

REFERENCES:
ME1206 - STRENGTH OF MATERIALS
(Common to Auto, Mech)

L T P C
3 1 0 4

OBJECTIVES

• To gain knowledge of simple stresses, strains and deformation in components due to external loads.
• To assess stresses and deformations through mathematical models of beams, twisting bars or combinations of both.
• Effect of component dimensions and shape on stresses and deformations are to be understood.
• The study would provide knowledge for use in the design courses

UNIT - I: STRESS, STRAIN AND DEFORMATION OF SOLIDS

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial load.

UNIT - II: BEAMS - LOADS AND STRESSES

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow.

UNIT - III: TORSION

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

UNIT - IV: BEAM DEFLECTION

UNIT - V: ANALYSIS OF STRESSES IN TWO DIMENSIONS

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr’s circle for biaxial stresses – Maximum shear stress - Strain energy in bending and torsion.

Total: 60

TEXT BOOKS

REFERENCES

EC1217 - ELECTRONICS AND MICROPROCESSOR
(Common to Auto & Mech)

OBJECTIVE
To enable the students to understand the fundamental concepts of Semi Conductors, Transistors, Rectifiers, Digital Electronics and 8085 Microprocessors

UNIT - I: SEMICONDUCTORS AND RECTIFIERS
Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-P type and N type-PN junction-Zenor effect-Zenor diode characteristics-Half wave and full wave rectifiers -Voltage regulation.

UNIT - II: TRANSISTORS AND AMPLIFIERS

- Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits-Class A, B and C amplifiers- Field effect transistor-Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics and simple applications-Switching transistors-Concept of feedback-Negative feedback-Application in temperature and motor speed control.

UNIT - III: Digital Electronics

- Binary number system - AND, OR, NOT, NAND, NOR circuits-Boolean algebra- Exclusive OR gate - Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion.

UNIT - IV: 8085 MICROPROCESSOR

- Block diagram of microcomputer-Architecture of 8085-Pin configuration-Instruction set-Addressing modes-Simple programs using arithmetic and logical operations.

UNIT - V: INTERFACING AND APPLICATIONS OF MICROPROCESSOR

- Basic interfacing concepts - Interfacing of Input and Output devices-Applications of microprocessor Temperature control, Stepper motor control, traffic light control.

Total: 60

TEXT BOOKS

REFERENCES
OBJECTIVE

To expose the students the different mechanisms, their method of working, Forces involved and consequent vibration during working

UNIT - I: MECHANISMS


UNIT - II: FRICTION

Friction in screw and nut – Pivot and collar – Thrust bearing – Plate and disc clutches – Belt (flat and V) and rope drives. Ratio of tensions – Effect of centrifugal and initial tension – Condition for maximum power transmission – Open and crossed belt drive.

UNIT - III: GEARING AND CAMS

Gear profile and geometry – Nomenclature of spur and helical gears – Gear trains: Simple, compound gear trains and epicyclic gear trains - Determination of speed and torque- Cams – Types of cams – Design of profiles – Knife edged, flat faced and roller ended followers with and without offsets for various types of follower motions.

UNIT - IV: BALANCING

Static and dynamic balancing – Single and several masses in different planes –Balancing of reciprocating masses- primary balancing and concepts of secondary balancing – Single and multi cylinder engines (Inline) – Balancing of radial V engine – direct and reverse crank method.

UNIT - V: VIBRATION


TEXT BOOKS


Total: 60
REFERENCES


AT1205 – AUTOMOTIVE MATERIALS & METALLURGY

OBJECTIVE

To impart knowledge on the structure, properties, treatment, testing and applications of metals and on non-metallic materials so as to identity and select suitable materials for various engineering applications.

Review (Not for Exam):

Crystal structure – BCC, FCC and HCP structure – unit cell – crystallographic planes and directions, miller indices – crystal imperfections, point, line, planar and volume defects – Grain size, ASTM grain size number.

Unit - I: CONSITITUION OF ALLOYS AND PHASE DIAGRAMS


Unit - II: HEAT TREATMENT


Unit - III: SELECTION OF MATERIALS

Criteria of selecting materials for automotive components viz cylinder block, Cylinder head,
piston, piston ring, Gudgeon pin, connecting rod, crank shaft, crank case, cam, cam shaft, engine valve, gear wheel, clutch plate, axle, bearings, chassis, spring, body panel, radiator, brake lining etc.

**Unit - IV: NON-METALLIC MATERIALS**


**Unit - V: MECHANICAL PROPERTIES AND TESTING**


**TEXT BOOKS**


**REFERENCES**


**AT1206 - AUTOMOTIVE TRANSMISSION**

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**OBJECTIVE**

To impart basic knowledge to students with respect to transmission system of automobiles and impart knowledge that will enable the student to understand the latest developments in the field.

**UNIT - I: CLUTCH AND GEAR BOX**

12
Clutch- Different types of clutches, working principles and constructions, torque capacity and design aspects.

Gear Box- method of calculation of gear ratios for vehicles, performance characteristics in different speeds, different types of gear boxes, speed synchronizing devices, gear materials, lubrication.

**UNIT - II: HYDRODYNAMIC DRIVE**

All spur and internal gear type planetary gearboxes, Ford T-model, Cotal and Wilson Gear box, determination of gear ratios, automatic overdrives.

**UNIT - III: AUTOMOTIVE TRANSMISSION**

Fluid coupling- advantages and limitations, construction details, torque capacity, slip in fluid coupling, performance characteristics. Means used to reduce drag torque in fluid coupling.

Principal of torque conversion, single, multi stage and polyphase torque converters, performance characteristics, constructional and operational details of typical hydraulic transmission drives.

**UNIT - IV: HYDROSTATIC DRIVE AND ELECTRIC DRIVE**

Automatic transmission: relative merits and demerits when compared to conventional transmission, automatic control of gears, study of typical automatic transmissions, Ford and Chevrolet drive, automatic control of gear box.

**UNIT - V: AUTOMATIC TRANSMISSION APPLICATIONS**

Hydrostatic drives- advantages and disadvantages, principles of hydrostatic drive systems, construction and working of typical hydrostatic drives, Janney Hydrostatic drive.

**Electrical drives**- advantages and limitations, principles of Ward Leonard system of control Modern electric drive for buses and performance characteristics.

Total: 60

**TEXT BOOKS**

2. Newton and Steeds - Motor Vehicle- Illiffee Publisher- 2000

**REFERENCE**


**EC1276 - ELECTRONICS AND MICROPROCESSOR LAB**

(Common to Auto, Mech)
LIST OF EXPERIMENTS

Electronics
1. VI Characteristics of PN Junction Diode
2. VI Characteristics of Zener Diode
3. Characteristics of CE Transistor
4. Characteristics of JFET
5. Characteristics of Uni Junction Transistor
6. RC or Wein Bridge Oscillator
7. Study of Logic Gates (Basic Gates)
8. Half Adder and Full Adder
9. Shift Registers and Counters
10. Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non-Inverting)

Microprocessor
1. Block Transfer
2. 8 bit Addition, Subtraction
3. Multiplication and Division
4. Maximum and Minimum of block of data
5. Sorting
6. Stepper Motor Interfacing

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

1. Voltmeters 5 No.
2. Ammeters 5 No.
3. PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters 1 set.
4. Digital Logic Trainer Kits 1 No.
5. Breadboards 1 No.
7.  D/A Converter Interface  1 No.
8.  Stepper Motor Interface  1 No.
9.  CRO  1 No.
10.  Wavefarm Generator  1 No.
11.  Multimeter  1 No.

**AT1224 - ENGINE TESTING LAB**

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**LIST OF EXPERIMENTS**

1. Study of hydraulic, electrical and eddy current dynamometers
2. Valve timing and port timing diagram
3. Performance test on two wheeler SI engine
4. Performance test on automotive multi-cylinder SI engine
5. Performance test on automotive multi-cylinder CI engine
6. Performance test on variable compression ratio engine
7. Retardation test on I.C. Engines.
8. Heat balance test on automotive multi-cylinder SI engine
9. Heat balance test on automotive multi-cylinder CI engine
10. Morse test on multi-cylinder SI engine
11. Study of P-θ and P-V diagrams for IC engine with piezo-electric pick up, charge amplifier, angle encoder.

**THE LIST OF equipments - Each 1 No**

**(FOR A BATCH OF 30 STUDENTS)**

1. Hydraulic dynamometer
2. Eddy current dynamometer
3. Electrical dynamometer
4. Single cylinder two stroke cut section engine
5. Single cylinder four stroke cut section engine
6. Two-wheeler engine test rig.
7. Automotive multicylinder SI engine test rig with heat balance arrangement
8. Automotive multicylinder CI engine test rig with heat balance arrangement
9. Variable Compression Ratio Engine

EL 1331 COMMUNICATION SKILLS LAB
( Common to All Branches Except CSE )

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OBJECTIVE

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

SEMESTER V
ME1306 - ENGINEERING METROLOGY & MEASUREMENTS
(Common to Auto, Mech)

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OBJECTIVE

To understand the principles of metrology and measurements, methods of measurement and its application in manufacturing industries.
Unit - I: CONCEPT OF MEASUREMENT

General concept – Generalized measurement system-Units and standards-measuring instruments- sensitivity, readability, range of accuracy, precision-static and dynamic response-repeatability-systematic and random errors-correction, calibration, interchangeability.

Unit - II: LINEAR AND ANGULAR MEASUREMENT

Definition of metrology-Linear measuring instruments: Vernier, micrometer, interval measurement, Slip gauges and classification, interferometry, optical flats, limit gauges-Comparators- Mechanical, pneumatic and electrical types, applications.

Angular measurements--Sine bar, optical bevel protractor, angle Decker – Taper measurements.

Unit - III: FORM MEASUREMENT

Measurement of screw threads-Thread gauges, floating carriage micrometer-measurement of gears-tooth thickness-constant chord and base tangent method-Gleason gear testing machine – radius measurements-surface finish, straightness, flatness and roundness measurements.

Unit - IV: LASER AND ADVANCES IN METROLOGY


Unit - V: MEASUREMENT OF POWER, FLOW AND TEMPERATURE RELATED PROPERTIES

Force, torque, power-mechanical, pneumatic, hydraulic and electrical type-Flow measurement-Venturi, orifice, rotameter, pitot tube –Temperature- bimetallic strip, pressure thermometers, thermocouples, electrical resistance thermister.

Total: 45

TEXT BOOKS

REFERENCES
3. Beckwith T.G, and N. Lewis Buck, Mechanical Measurements, Addison Wesley,
OBJECTIVE

All automobiles have important driveline and structural components. This subject deals with the functions and constructional details of all the chassis components.

UNIT - I: INTRODUCTION

Types of chassis layout with reference to power plant locations and drives, vehicle frames, various types of frames, constructional details, materials, testing of vehicle frames, unitized frame body construction.

UNIT - II: FRONT AXLE AND STEERING SYSTEM

Types of front axles, construction details, materials, front wheel geometry: castor, camber, king pin inclination, toe-in. conditions for true rolling motion of wheels during steering, steering geometry, Ackermann and Davis steering system, constructional details of steering linkages, different types of steering gear boxes, steering linkages and layouts, turning radius, wheel wobble, power assisted steering, steering of crawler tractors.

UNIT - III: DRIVE LINE

Effect of driving thrust and torque reactions, Hotchkiss drive, torque tube drive and radius rods, propeller shaft, universal joints, front wheel drive, different types of final drive, double reduction and twin speed final drives, differential principle, construction details of differential unit, non-slip differential, differential locks, differential housings, construction of rear axles, types of loads acting on rear axles, fully floating, three quarter floating and semi floating rear axles, rear axle housing, construction of different types of axle housings, multi axle vehicles.

UNIT - IV: SUSPENSION SYSTEM

Need of suspension system, types of suspension, suspension springs, constructional details and characteristics of leaf, coil and torsion bar springs, independent suspension, rubber suspension, pneumatic suspension, shock absorbers.

UNIT - V: BRAKING SYSTEM

Classification of brakes, drum brakes and disc brakes, constructional details, theory of braking,
concept of dual brake system, parking brake, material, hydraulic system, vacuum assisted system, air brake system, antilock braking, retarded engine brakes, eddy retarders.

Total: 60

TEXT BOOKS

REFERENCES

AT1302 - AUTOMOTIVE ELECTRICAL AND ELECTRONICS

OBJECTIVE

In Automobiles the electrical systems are important. It has number of subsystems like starting system, charging system etc., Also most of the control systems are being converted from mechanical to electronics. In this course the function and construction of various electrical components and electronic components and system are described.

UNIT - I: BATTERIES AND ACCESSORIES

Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator.

UNIT - II: STARTING SYSTEM

Condition at starting, behavior of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenances of
stater motor, starter switches.

UNIT - III: CHARGING SYSTEM

Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cutout, Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.

UNIT - IV: FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS

Current trends in automotive electronic engine management system, electro magnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system.

UNIT - V: SENSORS AND ACTIVATORS

Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.

Total: 45

TEXT BOOKS


REFERENCES

OBJECTIVE

To make the students understand the design concept and principles of various engine components. These concepts and principles are familiarized for design of components.

UNIT - I: INTRODUCTION 12

Engineering materials and their physical properties applied to design, selection of materials, factor of safety, endurance limit, notch sensitivity, principles of design optimization, future trends, computer aided drafting.

UNIT - II: LIMITS, FITS, TOLERANCES, SURFACE FINISH, SHAFTS AND SPRINGS 12

Definitions, types of tolerances and fits, design considerations for interference fits, surface finish, surface roughness, design of power transmission shafts, design of helical springs.

UNIT - III: DESIGN OF CYLINDER AND PISTON 12

Choice of material for cylinder and piston, piston friction, piston slap, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly.

UNIT - IV: DESIGN OF CONNECTING ROD, CRANKSHAFT 12

Material for connecting rod, determining minimum length of connecting rod, small end and big end design, shank design, design of big end cap bolts, connecting rod failures, balancing of I.C. Engines, significance of firing order, material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations.

UNIT - V: DESIGN OF VALVES AND FLYWHEEL 12

Design aspects of intake and exhaust manifolds, inlet and Exhaust valves, valve springs, tappets, valve train. Materials and design of flywheel.

Total: 60

TEXT BOOKS

REFERENCES
1. A.Kolchin and V.Demidov, “Design of Automotive Engines”, MIR Publishers, Moscow,
AT1304 - MANUFACTURING PROCESS OF AUTOMOTIVE COMPONENTS

OBJECTIVE:

To make the students to understand various processes like forming, milling, casting and moulding involved in manufacturing of automotive components.

UNIT - I: POWDER METALLURGY


UNIT - II: FORMING PROCESS


UNIT - III: CASTING AND MACHINING

Sand casting of cylinder block and liners – Centrifugal casting of flywheel, piston rings, bearing bushes and liners, permanent mould casting of piston, pressure die casting of carburetor and other small auto parts.


UNIT - IV: GEAR MANUFACTURING

Gear milling, Hobbing and shaping – Gear finishing and inspection.

UNIT - V: RECENT TRENDS IN MANUFACTURING OF AUTO COMPONENTS

Powder injection moulding – Shot peen hardening of gears – Production of aluminum MMC

**Total**: 45

**TEXT BOOK**


**REFERENCES**


**AT1305 - VEHICLE BODY ENGINEERING**

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**OBJECTIVE**

At the end of the course, the students will be able to have a sound knowledge for the design of the vehicles body to give maximum comfort for the passengers and exposed to the methods of stream lining the vehicles body to minimize drag.

**UNIT - I: CAR BODY DETAILS**

Types: saloon, convertibles, limousine, estate car, racing and sports car. Visibility: regulations, driver’s visibility, tests for visibility, methods of improving visibility and space in cars. Safety: safety design, safety equipments for cars. Car body construction; design criteria, prototype making, initial tests, crash tests on full scale model, Dummies and Instrumentation

**UNIT - II: VEHICLE AERODYNAMICS**

Objectives. Vehicle drag and types; various types of forces and moments, effects of forces and moments, side wind effects on forces and moments, Various body optimization techniques for minimum drag, wind tunnel testing: flow visualization techniques, scale model testing, component balance to measure forces and moments.

**UNIT - III: BUS BODY DETAILS**

8
Types: mini bus, single decker, double-decker, two level and articulated bus. Bus body layout; floor height, engine location, entrance and exit location, seating dimensions. Constructional details: frame construction, double skin construction, types of metal sections used, Regulations, Conventional and integral type construction.

UNIT - IV: COMMERCIAL VEHICLE DETAILS

Types of body; flat platform, drop side, fixed side, tipper body, tanker body, Light commercial vehicle body types. Dimensions of driver’s seat relation to controls. Drivers cab design.

UNIT - V: BODY MATERIALS, TRIM AND MECHANISMS

Steel sheet, timber, plastic, GRP, properties of materials, Corrosion, anticorrosion methods, Selection of paint and painting process. Body trim items, Body mechanisms.

Total: 45

TEXT BOOK


REFERENCES


AT1321 - AUTOMOTIVE CHASSIS COMPONENTS LABORATORY

L T P C
0 0 3 1

LIST OF EXPERIMENTS:

Study and measurement of the following chassis frames:

1. Heavy duty vehicle frame (Leyland, Tata etc)
2. Light duty vehicle frame (Ambassador, Maruti van etc)
Study, dismantling and assembling of

3. Front Axle
4. Rear Axle
5. Differential
6. Steering systems along with any two types of steering gear box
8. Leaf spring, coil spring, torsion bar spring, Hydraulic shock absorber

Study, Dismantling and Assembling of

9. Clutch assembly of different types
10. Gear Box
11. Transfer case

THE LIST OF EQUIPMENTS - Each 1 No

(For A Batch of 30 Students)

1. Heavy duty vehicle chassis frame
   (Leyland or Tata)
2. Light duty vehicle chassis frame
3. Front axle
4. Rear axle
5. Steering system
2. Steering gear box (Rack and pinion, recirculating
   Ball type)
3. Hydraulic brake system
4. Air brake system
5. Leaf spring, coil spring, torsion bar
6. Hydraulic shock absorber
7. Diaphragm clutch assembly
8. Gear box (light duty, heavy duty)
9. Transfer case
AT1322 - AUTOMOTIVE ELECTRICAL AND ELECTRONICS LABORATORY

List of Experiments:

a. Electrical Laboratory
1. Testing of batteries and battery maintenance
2. Testing of starting motors and generators
3. Testing of regulators and cut – outs relay
4. Diagnosis of ignition system faults
5. Study of automobile electrical wiring

b. Electronics Laboratory
6. Study of rectifiers and filters
7. Study of logic gates, adder and flip-flops
8. Study of SCR and IC timer
9. Interfacing A/D converter and simple data acquisition
10. Micro controller programming and interfacing

THE LIST OF EQUIPMENTS - Each 1 No
(For A Batch of 30 Students)

i. Battery, hydrometer, voltage tester
ii. Starter motor, regulator, cutout
iii. Distributor, ignition coil, spark plug
iv. Auto electrical wiring system
v. Rectifiers, filters
vi. Amplifier
vii. IC timer
viii. Data logger

AT1323 - COMPUTER AIDED MACHINE DRAFTING LAB

LIST OF EXPERIMENTS
1. Drawing of automobile components such as piston, connecting rod, valves, crank shaft, spark plug.
2. Assembly drawing of screw jack, piston – connecting rod assembly, Ram’s bottom safety valve assembly, plummer block, steam engine cross head.

THE LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS
2. Software like AutoCAD - 30 licenses

SEMESTER - VI
MG1301 - PRINCIPLES OF MANAGEMENT
(Common to All Branches)

OBJECTIVE
Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the
managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

**Unit - I: HISTORICAL DEVELOPMENT**


**Unit - II: PLANNING**


**Unit - III: ORGANISING**


**Unit - IV: DIRECTING**


**Unit - V: CONTROLLING**


**Total: 45**

**TEXT BOOKS**


**REFERENCES**


ME1308 - HEAT AND MASS TRANSFER
(Common to Auto, Mech)

L T P C
3 1 0 4

OBJECTIVES

- The course is intended to build up necessary background for understanding the physical behavior of various modes of heat transfer, like, conduction, convection and radiation.
- To understand the application of various experimental heat transfer correlations in engineering Calculations.
- To learn the thermal analysis and sizing of heat exchangers.
- To understand the basic concepts of mass transfer.

Unit - I: CONDUCTION 12


Unit - II: CONVECTION 12


Unit - III: PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS 12

**Unit - IV: RADIATION 12**


**Unit - V: MASS TRANSFER 12**


**Total: 60**

**TEXT BOOKS**


**REFERENCES**


**AT1306 - AUTOMOTIVE INSTRUMENTATION & EMBEDDED SYSTEM**

**OBJECTIVE:**

To make the students to understand the instruments involved in measurement of various automotive parameters and a basic knowledge on embedded systems.

**UNIT - I: MEASUREMENT CHARACTERSTICS 12**
Instrument Classification, Characteristics of Instruments – Static and dynamic, experimental error analysis, Systematic and random errors, Statistical analysis, Uncertainty, Experimental planning and selection of measuring instruments, Reliability of instruments.

**UNIT -II: AUTOMOTIVE INSTRUMENTATION** 12

Modern automotive instrumentation – computerized instrumentation system, multiplexing, sampling and advantages – Measurements – fuel quality, coolant temperature, oil pressure vehicles speed, Display devices – LED, LCD, VFD, CRT and types, CAN network, the glass cockpit and information system.

Onboard diagnostics – fault code displays. Off board diagnostics – engine data display, expert system occupant protection system – Airbag deployment system security and warning systems.

**UNIT - III: MEASUREMENT ANALYSIS** 12

Chemical, thermal, magnetic and optical gas analyzers, measurement of smoke, dust and moisture, gas chromatography, spectrometry, measurement of pH, Review of basic measurement techniques.

**UNIT - IV: INTRODUCTION TO EMBEDDED SYSTEM** 12


**UNIT - V: REAL TIME OPERATING SYSTEM (RTOS)** 12

Introduction to basic concepts of RTOS, Basics of real time & embedded system operating systems, RTOS – Interrupt handling, task scheduling; embedded system design issues in system development process – Action plan, use of target system, emulator, use of software tools.

Total: 60

**TEXT BOOKS**


REFERENCES

AT1307 - AUTOMOTIVE CHASSIS DESIGN

OBJECTIVE

At the end of the course the student will be able to understand the fundamental principles involved in design of components of automotive chassis, the complete design exercise and arrive at important dimensions of chassis components and appreciate the use of modern techniques like CAD.

UNIT - I: CLUTCH DESIGN CALCULATION 12

Design of single plate clutch, multi plate clutch, design of centrifugal clutch, cone clutch, energy dissipated, torque capacity of clutch, design of clutch components, design details of roller and sprag type of clutches

UNIT - II: GEAR BOX 12

Performance of vehicle, total resistance to motion, traction and tractive effort, acceleration, calculation of gear ratio, design of three speed gear box, design of four speed gear boxes.

UNIT - III: VEHICLE FRAME AND SUSPENSION 12

Study of loads, moments and stresses on frame members, computer aided design of frame for passenger and commercial vehicles, computer aided design of leaf springs, coil springs and torsion bar springs.

UNIT - IV: FRONT AXLE AND STEERING SYSTEMS 12
Analysis of loads, moments and stresses at different sections of front axle, determination of loads at kingpin bearings, wheel spindle bearings, choice of bearings, determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering.

UNIT - V: FINAL DRIVE AND REAR AXLE

Design of propeller shaft, design details of final drive gearing, design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings.

Total: 60

TEXT BOOKS


REFERENCES


AT 1308 - AUTOMOTIVE POLLUTION AND CONTROL

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OBJECTIVES

To make the students to realize the impact of automobile emissions on the environment and expose student to factors affecting the formation and control of automobile pollutants.

UNIT - I: INTRODUCTION
Vehicle population assessment in metropolitan cities and contribution to pollution, effects on human health and environment, global warming, types of emission, transient operational effects on pollution.

UNIT - II: POLLUTANT FORMATION IN SI ENGINES

Pollutant formation in SI Engines, mechanism of HC and CO formation in four stroke and two stroke SI engines, NOx formation in SI engines, effects of design and operating variables on emission formation, control of evaporative emission. Two stroke engine pollution.

UNIT - III: POLLUTANT FORMATION IN CI ENGINES

Pollutant formation in CI engines, smoke and particulate emissions in CI engines, effects of design and operating variables on CI engine emissions, Nox formation and control. Noise pollution from automobiles, measurement and standards.

UNIT - IV: CONTROL OF EMISSIONS FROM SI AND CI ENGINES

Design of engine, optimum selection of operating variables for control of emissions, EGR, Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel modifications, fuel cells, two stroke engine pollution controls.

UNIT - V: MEASUREMENT TECHNIQUES EMISSION STANDARDS AND TEST PROCEDURE

NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles – USA, Japan, Euro and India. Test procedures – ECE, FTP Tests. SHED Test – chassis dynamometers, dilution tunnels.

Total: 45

TEXT BOOKS

REFERENCES
OBJECTIVE

The aim of this course is to make the students to know and understand the constructional details operating characteristics and vehicle design aspects.

UNIT - I: POWER UNIT

Two stroke SI engine, four stroke SI engine; merits and demerits, Symmetrical and unsymmetrical port timing diagrams, Types of scavenging processes, merits and demerits, scavenging pumps, Rotary valve engine. Fuel system, Lubrication system. Magneto coil and battery coil spark ignition system, electronic ignition system. Starting system, Kick starter system.

UNIT - II: CHASSIS AND SUB-SYSTEMS


UNIT - III: BRAKES, WHEELS AND TYRES

Drum brakes, disc brakes, front and rear brake links, layouts, Spoked wheel, cast wheel, disc wheel, disc types. Tyres and tubes.

UNIT - IV: TWO WHEELERS

Case study of major Indian models of motorcycles, scooters and mopeds, TVS mopeds and motorcycles, Hero Honda motorcycles, Bajaj scooters and motorcycles, Yamaha, Enfield motorcycles. Servicing and maintenance.

UNIT - V: THREE WHEELERS

Case study of Indian models, Auto rickshaws, pickup van, delivery van and trailer, Maintenance: daily, weekly, monthly, Fault tracing.

TEXT BOOK


REFERENCES


**AT 1324 - TWO AND THREE WHEELERS LAB**

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**LIST OF EXPERIMENTS:**

1. Road performance test of a two wheeler using chassis dynamometer.
2. Performance test of a shock absorber.
3. Performance test on coil spring.
4. Two wheeler chain tension test.
5. Brake and Clutch adjustment as per specification.
6. Dismantling and assembling of two wheeler gear box and finding gear ratio.
7. Dismantling and assembling of three wheeler gear box and finding gear ratios.
8. Three wheeler brake and clutch play adjustment
9. Dismantling and assembling of three wheeler steering system.
10. Study of three wheeler chassis frame and power transmission system.

**THE LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS**

a. Two wheeler chassis dynamometer - 1 No.
b. Shock absorber test rig - 1 No.
c. Two-wheeler gearbox - 2 Nos.
d. Two-wheeler clutch - 2 Nos.
e. Three-wheeler brake assembly - 2 Nos.
f. Three-wheeler steering assembly - 2 Nos.
g. Three-wheeler gear box - 2 Nos.

**AT 1325 - COMPUTER AIDED CHASSIS DESIGN LAB**

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CLUTCH
1. Complete design of clutch components.
2. Assembly drawing of clutch using drafting software.

GEAR BOX
3. Gear train calculations.
4. Layout of gear box.
5. Calculation of bearing loads
6. Selection of bearings.
7. Assembly drawing of gear box using drafting software.

THE LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS
2. Software like AutoCAD or Pro-E - 15 licenses

AT1326 - COMPUTER AIDED ENGINE DESIGN LAB

List of Experiments:
1. Design and drawing of piston.
2. Piston pin and piston rings and drawing of these components.
3. Design of connecting rod small end and big end, shank design, design of big end cap, bolts and drawing of the connecting rod assembly
4. Design of crankshaft, balancing weight calculations.
5. Design and drawing of flywheel.
6. Design and drawing of the inlet and exhaust valves.
7. Design of cam and camshaft, cam profile generation, drawing of cam and camshaft.
8. Design of Cylinder.

THE LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

2. Software like Pro-E or CATIA - 30 licenses

SEMESTER – VII
MG1401 - TOTAL QUALITY MANAGEMENT
(Common to All Branches)

L  T  P  C
3  0  0  3

OBJECTIVES
• To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
• To understand the statistical approach for quality control.
• To create an awareness about the ISO and QS certification process and its need for the industries.

Unit - I: INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

Unit - II: TQM PRINCIPLES 9


Unit - III: STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

Unit - IV: TQM TOOLS 9


Unit - V: QUALITY SYSTEMS 9


Total: 45

TEXT BOOK
REFERENCES


CE 1403 - ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common to Aero Auto, Civil & Mech)

L T P C
3 0 0 3

OBJECTIVE

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity.

UNIT - I: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural
resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT - III: ENVIRONMENTAL POLLUTION

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Field Study of local polluted site – Urban / Rural / Industrial / Agricultural

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT


UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – Population explosion – Family Welfare

Total: 45

TEXT BOOKS


REFERENCES


AT1401 - MODERN VEHICLE TECHNOLOGY

L T P C
3 0 0 3

OBJECTIVE:

To impart knowledge about Modern Vehicle Technology

At the end of the course students will be able to know
1. The recent trends in power plants
2. Noise and pollution in automobiles
3. Vehicle operation and control
4. Vehicle automated tracks

UNIT - I: TRENDS IN POWER PLANTS


UNIT - II: SUSPENSION BRAKES AND SAFETY

Air suspension – Closed loop suspension – antiskid braking system, Retarders, Regenerative braking safety cage – air bags – crash resistance – passenger comfort

UNIT - III: NOISE & POLLUTION

Reduction of noise – Internal & external pollution control through alternate fuels / power plants – Catalytic converters and filters for particulate emission.

UNIT - IV: VEHICLE OPERATION AND CONTROL

Computer control for pollution and noise control and for fuel economy – Transducers and actuators – Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

UNIT - V: VEHICLE AUTOMATED TRACKS

Preparation and maintenance of proper road network – National highway network with automated roads and vehicles – Satellite control of vehicle operation for safe and fast travel.

Total: 45

TEXT BOOKS


REFERENCES

OBJECTIVE

At the end of the course, the students will be able to have a complete knowledge of the vehicle maintenance procedures and acquire skills in handling situations where the vehicle is likely to fail.

UNIT - I: MAINTENANCE OF RECORDS AND SCHEDULES

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT - II: ENGINE MAINTENANCE – REPAIR AND OVERHAULING

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT - III: CHASSIS MAINTENANCE - REPAIR AND OVERHAULING

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT - IV: ELECTRICAL SYSTEM MAINTENANCE – SERVICING AND REPAIRS

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V: MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

Total: 45

TEXT BOOK

REFERENCES

2. Service Manuals from Different Vehicle Manufacturers.

AT1403 - VEHICLE DYNAMICS

OBJECTIVE

When the vehicle is at dynamic condition more vibration will be produced. It is essential to study about vibrations and how to reduce the vibration under different loads, speed and road conditions in order to improve the comfort for the passengers and life of the various components of the vehicle. In this subject these aspects have been given.

UNIT - I: INTRODUCTION

Single degree of freedom, two degree of freedom, free, forced and damped vibrations modeling and simulation studies, model of an automobile, magnification factor, transmissibility, vibration absorber.

UNIT - II: MULTI DEGREE FREEDOM SYSTEMS

Closed and coupled far system, orthogonality of mode shapes, modal analysis.

UNIT - III: STABILITY OF VEHICLES

Load distribution, stability on a curved track slope and a banked road, calculation of tractive effort and reactions for different drives.

UNIT - IV: SUSPENSION TYRES AND VEHICLES HANDLING

Requirements, sprung mass frequency, wheel hop, wheel wobble, wheel shimmy, choice of suspension spring rate, calculation of effective spring rate, vehicle suspension in fore and aft, roll axis and vehicle under the action of side forces, tyre, dynamics, ride characteristics power consumed by a tyre, Oversteer, under steer, steady state cornering, effect of braking, driving torques on steering, effect of camber, transient effects in cornering.

UNIT - V: NUMERICAL METHODS

Approximate methods for determining fundamental frequency, Dunkerleys lower bound, Rayleighs upper bound, Holzer method for closed coupled system and branched system.

Total: 60
TEXT BOOKS

REFERENCES

AT1421 - VEHICLE MAINTENANCE & RECONDITIONING LABORATORY

LIST OF EXPERIMENTS:

VEHICLE MAINTENANCE LABORATORY
1. Study And Layout Of Automobile Repair Shop.
2. Study And Preparation Of Workshop Statements.
3. Study And List Of Tools And Instruments.
4. Minor And Major Tuning Of Diesel And Petrol Engines.
5. Fault Diagnosis Of Ignition, Starting And Charging System.
6. Fault Diagnosis Of Petrol And Diesel Fuel System And Filters & Air Cleaners.
7. Fault Diagnosis Of Lighting System Horn & Wiper.
9. Adjustment Of Pedal Play In Clutch Brake,

   Hand Brake And Steering Wheel.
10. A) Bleeding Of Hydraulic Brake System And

    Diesel Fuel System.

   B) Wheel Bearing Adjustment.
C) Removal Of Tyre & Tube.
D) Adjustment Of Head Lights.

RE-CONDITIONING LABORATORY

1. Cylinder reboring – checking the cylinder bore.
2. Valve grinding, valve lapping.
3. Setting the valve angle and checking for valve leakage
4. Calibration of fuel injection pump
5. Wheel alignment – testing of camber, caster.
7. Brake adjustment
8. Brake bleeding.

LIST OF EQUIPMENTS FOR VEHICLE MAINTENANCE - Each 1 No

(For a batch of 30 students)

1. Engine Analyzer
2. Cylinder compression pressure gauge
3. Vacuum gauge
4. Spark plug cleaner and tester
5. Cam angle and rpm tester
6. Techometer
7. Wheel alignment apparatus
8. Gas welding equipment
9. Tyre remover
10. Bearing puller
11. Head light alignment gauge
12. Service manuals of petrol, diesel engines

LIST OF EQUIPMENTS FOR RECONDITIONING

(For a batch of 30 students) Each 1 No

1. Cylinder reboring machine
2. Valve grinding machine
3. Valve lapping machine
4. Fuel injection calibration test bench with nozzle tester
5. Wheel alignment apparatus

AT 1422 - SOFTWARE APPLICATIONS LAB

LIST OF EXPERIMENTS:
Modeling and Analysis of following IC Engine Parts
1. Piston
2. Piston Pin and Piston Rings
3. Connecting Rod
4. Inlet and Exhaust Valves
5. Crankshaft
6. Balancing weight of Crankshaft
7. Camshaft

LIST OF EQUIPMENTS
(For a batch of 30 students)
2. Software like Pro/E, CATIA and ANSYS - 30Nos.

AT 1423 - DESIGN PROJECT

Students should design and develop model of Automobile systems and validate the results.

SEMESTER -VIII
MG 1402 - ENTREPRENEURSHIP DEVELOPMENT
(Common to All Branches)
OBJECTIVE

Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

Unit – I: ENTREPRENEURSHIP


Unit – II: MOTIVATION

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

Unit – III: BUSINESS


Unit – IV: FINANCING AND ACCOUNTING


Unit – V: SUPPORT TO ENTREPRENEURS


TOTAL: 45

TEXT BOOKS


REFERENCES


**AT1424 - PROJECT WORK**

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**OBJECTIVE**

The objective of the project work is to enable the students in convenient groups of not more than 3 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment shall be made as prescribed by the regulation.

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**SEMESTER VII**

**ELECTIVE COURSES**

**GE1401 – PROFESSIONAL ETHICS & HUMAN VALUES**

(Common to Auto & Mech)
OBJECTIVES

• To create an awareness on Engineering Ethics and Human Values.
• To instill Moral and Social Values and Loyalty
• To appreciate the rights of Others

UNIT - I: HUMAN VALUES 10


UNIT - II: ENGINEERING ETHICS 9


UNIT - III: ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

UNIT - IV: SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies.


UNIT - V: GLOBAL ISSUES 8

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

TOTAL: 45

TEXT BOOKS

REFERENCES
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)

MA1401 – OPERATION RESEARCH
(Common to Auto, EEE & Mech)

OBJECTIVES
- To create awareness about optimization in utilization of resources.
- To understand and apply operations research techniques to industrial operations.

Unit – I: LINEAR MODEL
The phases of OR study – formation of an L.P model- graphical solution – simplex algorithm – artificial variables technique– Big M method, two phase method.

Unit – II: TRANSPORTATION PROBLEM

Unit – III: NETWORK MODELS

**Unit – IV: REPLACEMENT MODELS 12**


**Unit – V: QUEUING THEORY 12**

Queuing models – queuing systems and structures – notation – parameter – single server and multiserver models – Poisson input – exponential service – constant rate service – infinite population

**TOTAL: 60**

**TEXT BOOK**


**REFERENCES**


**ME1437 - DESIGN OF JIGS, FIXTURES & PRESS TOOLS**

(Common to Auto & Mech)
OBJECTIVES

• To understand the principles, functions and design practices of Jigs, Fixtures and dies for press working

• To understand the Principles of jigs and fixtures design, locating principles, locating elements and clamping Devices.

Unit – I: PURPOSE TYPES AND FUNCTIONS OF JIGS AND FIXTURES 8


Unit – II: JIGS 9

Drill bushes –different types of jigs-plate latch, channel, box, post, angle plate, angular post, turnover, pot jigs-Automatic drill jigs-Rack and pinion operated. Air operated Jigs components. Design and development of Jigs for given components.

Unit – III: FIXTURES 9

General principles of boring, lathe, milling and broaching fixtures- Grinding, planning and shaping fixtures, assembly, Inspection and welding fixtures- Modular fixtures . Design and development of fixtures for given component.

Unit – IV: PRESS WORKING TERMINOLOGIES AND ELEMENTS OF DIES AND STRIP LAY OUT 10


Unit – V: DESIGN AND DEVELOPMENT OF DIES 9

Design and development of progressive and compound dies for Blanking and piercing operations. Bending dies – development of bending dies-forming and drawing dies-Development of drawing dies. Design considerations in forging, extrusion, casting and plastic dies

TOTAL: 45

(Use of approved design data book is permitted)

TEXT BOOKS


REFERENCES

5. PSG College of Technology, Coimbatore - Design Data Handbook

ME1439 - COMPUTATIONAL FLUID DYNAMICS
(Common to Auto & Mech)

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OBJECTIVES

• To introduce numerical modeling and its role in the field of heat transfer and fluid flow.
• To enable the students to understand the various discretization methods and solving methodologies.
• To create confidence to solve complex problems in the field of heat transfer and fluid dynamics by using high speed computers.

Unit – I: GOVERNING EQUATIONS AND BOUNDARY CONDITIONS 12


Unit – II: DISCRETIZATION AND SOLUTION METHODOLOGIES 12


Solution methodologies: Direct and iterative methods, Thomas algorithm, Relaxation method, Alternating Direction Implicit method.
Unit – III: HEAT CONDUCTION 12

Finite difference and finite volume formulation of steady/transient one-dimensional conduction equation, Source term linearization, Incorporating boundary conditions, Finite volume formulations for two and three dimensional conduction problems

Unit – IV: CONVECTION AND DIFFUSION 12

Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes - Discretization equations for two dimensional convection and diffusion.

Unit – V: CALCULATION OF FLOW FIELD 12

• Representation of the pressure - Gradient term and continuity equation - Staggered grid - Momentum equations - Pressure and velocity corrections - Pressure - Correction equation, SIMPLE algorithm and its variants. Turbulence models: mixing length model, Two equation (k-e) models.

TOTAL: 60

TEXT BOOKS

REFERENCES

AE1402 - COMPOSITE MATERIALS & STRUCTURES
(Common to Aero, Auto & Mech)
OBJECTIVE

This subject introduces to the students the different types of composite materials, their properties and applications.

Unit – I: INTRODUCTION TO COMPOSITES


Unit – II: POLYMER MATRIX COMPOSITES


Unit – III: METAL MATRIX COMPOSITES


Unit – IV: CERAMIC MATRIX COMPOSITES


Unit – V: ADVANCES IN COMPOSITES


TOTAL: 45

TEXT BOOKS


REFERENCES

AT1404 - FINITE ELEMENT ANALYSIS

L T P C
3 1 0 4

OBJECTIVES
• To understand the principles involved in discretization and finite element approach
• To learn to form stiffness matrices and force vectors for simple elements

Unit – I: INTRODUCTION


Unit – II: ONE DIMENSIONAL PROBLEMS

Finite element modeling – Coordinates and shape functions- Potential energy approach – Galarkin approach – Assembly of stiffness matrix and load vector – Finite element equations – Quadratic shape functions – Applications to plane trusses

Unit – III: TWO DIMENSIONAL CONTINUUM


Unit – IV: AXISYMMETRIC CONTINUUM

Axisymmetric formulation – Element stiffness matrix and force vector – Galarkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to
cylinders under internal or external pressures – Rotating discs

Unit – V: ISOPARAMETRIC ELEMENTS FOR TWO DIMENSIONAL CONTINUUM 12

The four node quadrilateral – Shape functions – Element stiffness matrix and force vector
– Numerical integration - Stiffness integration – Stress calculations – Four node quadrilateral for
axisymmetric problems.

TOTAL: 60

TEXT BOOKS

1. Chandrupatla T.R., and Belegundu A.D., Introduction to Finite Elements in Engineering,

REFERENCES

2. Logan D.L., A First course in the Finite Element Method, Third Edition, Thomson Learning,
   2002.
   Element Analysis”, 2003.

SEMESTER VIII
ELECTIVE COURSES

AT1405 - ALTERNATIVE FUELS AND ENERGY SYSTEM
OBJECTIVE

At the end of the course, the student will be able to acquire knowledge of alternate fuels and the changes in the engine design for handling them and understand various energy systems for use in the automobiles.

UNIT - I: INTRODUCTION

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources. Like EV, hybrid, fuel cell and solar cars.

UNIT - II: ALCOHOLS

Properties as engine fuel, alcohols and gasoline blends, performance in SI engine, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT - III: NATURAL GAS, LPG, HYDROGEN AND BIOGAS

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG using LPG in SI & CI engines, performance and emission of LPG. Hydrogen; storage and handling, performance and safety aspects.

UNIT - IV: VEGETABLE OILS

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, bio diesel and its characteristics

UNIT - V: ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

Total: 45

TEXT BOOK

REFERENCES

4. SAE paper nos. 840367, 841333, 841334, 841156, Transactions, SAE, USA.

MG1404 - ENGINEERING ECONOMICS AND COST ANALYSIS
(Common to Auto & Mech)

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OBJECTIVE

To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.

UNIT – I: INTRODUCTION TO ECONOMICS


UNIT - II: VALUE ENGINEERING

Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.

UNIT – III: CASH FLOW

Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash
flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the methods.

**UNIT – IV: REPLACEMENT AND MAINTENANCE ANALYSIS 9**

Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

**UNIT – V: DEPRECIATION 9**


**TOTAL: 45**

**TEXT BOOK**


**REFERENCES**

OBJECTIVES

• To introduce the concept of SQC
• To understand process control and acceptance sampling procedure and their application.
• To learn the concept of reliability.

UNIT – I:  INTRODUCTION AND PROCESS CONTROL FOR VARIABLES 10

Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality cost-Variation in process- factors – process capability – process capability studies and simple problems – Theory of control chart- uses of control chart – Control chart for variables – X chart, R chart and ε chart.

UNIT – II: PROCESS CONTROL FOR ATTRIBUTES 8

Control chart for attributes –control chart for proportion or fraction defective – p chart and np chart – control chart for defects – C and U charts, State of control and process out of control identification in charts.

UNIT - III : ACCEPTANCE SAMPLING 9


UNIT – IV: LIFE TESTING - RELIABILITY 9


UNIT - V: QUALITY AND RELIABILITY 9


TOTAL: 45

TEXT BOOKS

REFERENCES


AT1406 - VIBRATION AND NOISE CONTROL

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OBJECTIVE

The students will be able to understand the sources of vibration and noise in automobiles and make design modifications to reduce the vibration and noise and improve the life of the components

UNIT - I: BASICS OF VIBRATION

Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree and two degree of freedom systems, torsional vibration, determination of natural frequencies.

UNIT – II: BASICS OF NOISE

Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT – III: AUTOMOTIVE NOISE SOURCES

Noise Characteristics of engines, engine overall noise levels, assessment of combustion noise, assessment of mechanical noise, engine radiated noise, intake and exhaust noise, engine
accessory contributed noise, transmission noise, aerodynamic noise, tyre noise, brake noise.

UNIT – IV: CONTROL TECHNIQUES 9

Vibration isolation, tuned absorbers, untuned viscous dampers, damping treatments, application dynamic forces generated by IC engines, engine isolation, crank shaft damping, modal analysis of the mass elastic model shock absorbers.

UNIT – V: SOURCE OF NOISE AND CONTROL 9

Methods for control of engine noise, combustion noise, mechanical noise, predictive analysis, palliative treatments and enclosures, automotive noise control principles, sound in enclosures, sound energy absorption, sound transmission through barriers

TOTAL: 45

TEXT BOOKS


REFERENCES

OBJECTIVE

At the end of the course, the students will be able to understand the components of the automotive air-conditioning and their functions and the latest developments in this field.

UNIT – I: AIRCONDITIONING FUNDAMENTALS

Basic air conditioning system - location of air conditioning components in a car, schematic layout of a refrigeration system, compressor components, condenser and high pressure service ports, thermostatic expansion valve, expansion valve calibration, controlling evaporator temperature, evaporator pressure regulator, evaporator temperature regulator.

UNIT – II: AIR CONDITIONER – HEATING SYSTEM

Automotive heaters, manually controlled air conditioner, heater system, automatically controlled air conditioner and heater systems, automatic temperature control, air conditioning protection, engine protection.

UNIT – III: REFRIGERANT

Containers handling refrigerants, tapping into the refrigerant container, refrigeration system diagnosis, diagnostic procedure, ambient conditions affecting system pressures.

UNIT – IV: AIR ROUTING AND TEMPERATURE CONTROL

Objectives, evaporator airflow through the recirculating unit, automatic temperature control, duct system, controlling flow, vacuum reserve, testing the air control and handling systems.

UNIT – V: AIR CONDITIONING SERVICE

Air conditioner maintenance and service, servicing heater system removing and replacing components, trouble shooting of air controlling system, compressor service.

TOTAL: 45

TEXT BOOK


REFERENCES


UNIT – I: TRACTORS AND FARM EQUIPMENTS

Classification and power required - Design consideration - Ride and stability characteristics power plants and transmission – Farm equipments.

UNIT – II: EARTH MOVING MACHINES

Construction and operation aspects of Bull dozers, scrapers, Dumpers, Loaders, Mobile cranes, Road rollers, Elevators and Elevating graders.

UNIT – III: MILITARY AND COMBAT VEHICLES

Special requirements like power, fuel strength and impact resistance tanker, Gun carrier and transport vehicle.

UNIT – IV: CLASSIFICATION AND REQUIREMENTS OF HEAVY VEHICLES

Power plants, chassis and transmission.

UNIT – V: TWO AND THREE WHEELERS

Constructional details of engine components in moped, scooter, motorcycle and three wheelers.

Magneto ignition systems multiple disc clutch and centrifugal clutch details. Types of gear boxes, types of driver – chain drive, shaft drive, frame and front forks, two wheeler suspension system.

TOTAL: 45

TEXT BOOK


REFERENCES

1. Motor cycle – M. Michaeal Griffer


**AT1409 - TRANSPORT MANAGEMENT**

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**OBJECTIVE**

After completion of this course the students are able to manage a transport fleet and their related activities for minimizing operational cost.

**UNIT – I: INTRODUCTION**

Personnel management; objectives and functions of personnel management, psychology, sociology and their relevance to organization, personality problems. Selection process: job description, employment tests, interviewing, introduction to training objectives, advantages, methods of training, training procedure, psychological tests.

**UNIT – II: TRANSPORT SYSTEMS**

Introduction to various transport systems. Advantages of motor transport. Principal function of administrative, traffic, secretarial and engineering divisions. Chain of responsibility, forms of ownership by state, municipality, public body and private undertakings.

**UNIT – III: SCHEDULING AND FARE STRUCTURE**

Principal features of operating costs for transport vehicles with examples of estimating the costs. Fare structure and method of drawing up of a fare table. Various types of fare collecting methods. Basic factors of bus scheduling. Problems on bus scheduling.

**UNIT – IV: MOTOR VEHICLE ACT**

Traffic signs, fitness certificate, registration requirements, permit insurance, constructional regulations, description of vehicle-tankers, tippers, delivery vans, recovery vans, Power wagons and fire fighting vehicles. Spread over, running time, test for competence to drive.

**UNIT – V: MAINTENANCE**

Preventive maintenance system in transport industry, tyre maintenance procedures. Causes for uneven tyre wear; remedies, maintenance procedure for better fuel economy, Design of bus depot layout.

TOTAL: 45

**TEXTBOOK**


**REFERENCES**
AT1410 - ADVANCED THEORY OF I.C. ENGINES

OBJECTIVE

At the end of the course, the students will be able to understand the significance of various processes in I.C Engines.

UNIT – I: CYCLE ANALYSIS

Otto, Diesel, Dual, Stirling and Brayton cycles, comparison of air standard, fuel air and actual cycles, simple problems on the above topics.

UNIT – II: COMBUSTION

Combustion reactions and stoichiometry, heat of reaction, adiabatic flame temperature in constant pressure and constant volume systems, fuels for internal combustion engines and their properties, premixed and diffusion combustion as applicable to SI and CI engines, concepts of burning rate and flame velocity, fuel spray characteristics and combustion in diesel engines.

UNIT – III: COMBUSTION MODELLING

Basic concepts of engine simulation, governing equations, simulation of various engine processes for SI and CI engines. Adiabatic flame temperature, Heat release calculations. Thermodynamic and Fluid mechanic based models.

UNIT – IV: ADVANCES IN IC ENGINES

LHR engines, surface ignition concept and multi fuel engines, stratified charge and lean burn engines, performance and emission characteristics, merits and demerits.

UNIT – V: ELECTRONIC ENGINE MANAGEMENT

Computer control of SI & CI engines for better performance and low emissions, closed loop control of engine parameters of fuel injection and ignition

TOTAL: 45

TEXT BOOKS


REFERENCES

AT1411 - AUTOMOTIVE AERODYNAMICS

OBJECTIVE

At the end of the course, the students will be able to apply basic principles of aerodynamics for the design of vehicle body.

UNIT – I: INTRODUCTION

Scope, historical developments, fundamental of fluid mechanics, flow phenomenon related to vehicles, external and Internal flow problem, resistance to vehicle motion, performance, fuel consumption and performance potential of vehicle aerodynamics, engine cooling requirement, air flow to passenger compartment, duct for air conditioning, cooling of transverse engine and rear engine.

UNIT – II: AERODYNAMIC DRAG OF CARS

Cars as a bluff body, flow field around car, drag force, types of drag force, analysis of aerodynamic drag, drag coefficient of cars, strategies for aerodynamic development, low drag profiles.

UNIT – III: SHAPE OPTIMIZATION OF CARS

Front end modification, front and rear wind shield angle, boat tailing, hatch back, fast back and square back, dust flow patterns at the rear, effects of gap configuration, effect of fasteners.

UNIT – IV: VEHICLE HANDLING

The origin of forces and moments on a vehicle, lateral stability problems, methods to calculate forces and moments – vehicle dynamics under side winds, the effects of forces and moments,
characteristics of forces and moments, dirt accumulation on the vehicle, wind noise, drag reduction in commercial vehicles.

UNIT – V: WIND TUNNELS FOR AUTOMOTIVE AERODYNAMICS 9

Introduction, principle of wind tunnel technology, limitation of simulation, stress with scale models, full scale wind tunnels, measurement techniques, equipment and transducers, road testing methods, numerical methods.

TOTAL: 45

TEXT BOOK

REFERENCES

AT1412 - SIMULATION OF I.C. ENGINE PROCESSES

OBJECTIVE
To understand combustion phenomenon inside the cylinder and its computer simulation.

UNIT – I: INTRODUCTION 9


UNIT – II: SI ENGINE SIMULATION WITH FUEL AIR AS WORKING MEDIUM 9

Deviation between actual and air standard cycles of operation- problems, SI engine simulation with adiabatic constant volume combustion with fuel and air being considered, calculation of temperature drop due to fuel vaporization, calculation of mean effective pressure, torque and thermal efficiency at full throttle, part throttle and supercharged conditions.

UNIT – III: ACTUAL CYCLE SIMULATION IN SI ENGINES 9
Progressive combustion; gas exchange process, heat transfer process, friction. Validation of the computer code with experimental data based on performance parameters and pressure crank angle diagram.

UNIT – IV: SIMULATION OF 2-STROKE SI ENGINE 9

Simulation of the scavenging process, determination of the pressure-crank angle variation, computation of performance parameters.

UNIT – V: DIESEL ENGINE SIMULATION 9

Main difference between SI and CI engine simulation, differences between ideal and actual cycles, zero dimensional combustion model for diesel engine, heat transfer and gas exchange processes. Performance prediction and comparison of results.

TOTAL: 45

TEXT BOOKS


REFERENCES


AT1413 - AUTOMOTIVE SAFETY
OBJECTIVE

At the end, the student will have good exposure to Automotive safety aspects including safety equipments.

UNIT – I: INTRODUCTION

Design of the body for safety, energy equation, engine location, deceleration of vehicle inside passenger compartment, deceleration on impact with stationary and movable obstacle, concept of crumble zone, safety sandwich construction.

UNIT – II: SAFETY CONCEPTS

Active safety: driving safety, conditional safety, perceptibility safety, operating safety- passive safety: exterior safety, interior safety, deformation behaviour of vehicle body, speed and acceleration characteristics of passenger compartment on impact.

UNIT – III: SAFETY EQUIPMENTS

Seat belt, regulations, automatic seat belt tightener system, collapsible steering column, tiltable steering wheel, air bags, electronic system for activating air bags, bumper design for safety.

UNIT – IV: COLLISION WARNING AND AVOIDANCE

Collision warning system, causes of rear end collision, frontal object detection, rear vehicle object detection system, object detection system with braking system interactions.

UNIT – V: COMFORT AND CONVENIENCE SYSTEM

Steering and mirror adjustment, central locking system, Garage door opening system, tyre pressure control system, rain sensor system, environment information system

TOTAL: 45

TEXT BOOK


REFERENCES


AT1414 - FUEL CELLS APPLICATION
OBJECTIVE

At the end of the course, the students will be able to understand the Fuel Cells Application.

UNIT – I: INTRODUCTION TO FUEL CELLS

Introduction – working and types of fuel cell – low, medium and high temperature fuel cell, liquid and methanol types, proton exchange membrane fuel cell solid oxide, hydrogen fuel cells – thermodynamics and electrochemical kinetics of fuel cells.

UNIT – II: FUEL CELLS FOR AUTOMOTIVE APPLICATIONS


UNIT – III: FUEL CELL COMPONENTS AND THEIR IMPACT ON PERFORMANCE

Fuel cell performance characteristics – current/voltage, voltage efficiency and power density, ohmic resistance, kinetic performance, mass transfer effects – membrane electrode assembly components, fuel cell stack, bi-polar plate, humidifiers and cooling plates.

UNIT – IV: FUELING


UNIT – V: FUEL CYCLE ANALYSIS

Introduction to fuel cycle analysis – application to fuel cell and other competing technologies like battery powered vehicles, SI engine fueled by natural gas and hydrogen and hybrid electric vehicle.

TOTAL: 45

TEXT BOOKS


OBJECTIVE: To introduce the modern developments in vehicle technology.

UNIT I: ENGINE MANAGEMENT SYSTEMS

Electronically controlled SI and CI engine fuel injection systems, related hardware and software. Closed loop ignition system. Catalytic converters and particulate traps.

UNIT II: CHASSIS

Active suspension control, Pneumatic suspensions.

UNIT III: HEATING AND AIR CONDITIONING

Principles of vehicle air conditioning and heating.

UNIT IV: COMFORT AND CONVENIENCE

Adaptive cruise control, car entertainment, power windows, navigation system, adaptive noise control, electric seats, driver information system. Power windows, power steering.

UNIT V: SAFETY AND SECURITY SYSTEMS

Airbags, seat belt tightening system, collapsible and tiltable steering column, Anti theft system, anti lock braking system, electronic stability control system/traction control system, roll over protection system.

TOTAL: 45

TEXT BOOKS


REFERENCE