



**DR. A P J ABDUL KALAM UNIVERSITY,
INDORE**

SYLLABUS

For

DIPLOMA in AUTOMOBILE ENGINEERING

(PART TIME)

(FOURTH YEAR, 8th SEM)

College of Polytechnic Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Diploma in Automobile Engineering (Part Time)

List of Subject (FOURTH YEAR, 8th Sem)

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Unit 1: LICENSING

Need of licensing, authorities Procedure of licensing, qualification of drivers and learners licensing, driving test validity period , renewal of driving license licensing of heavy commercial and special vehicle drivers. Various rules and formats for licensing, driving schools and establishments . Diseases and disabilities, disqualifying a person to possess driving licenses.

Unit 2: REGISTRATION OF MOTOR VEHICLES

Need of Registrations, meaning of registrations, registering authorities, conditions for exemption from registration, Trade certificate, renewal of trade certificate period of validity, trade registrations marks and number, form and manner of display of registration marks on motor vehicles. Size of letters and numerals, transfer of ownership, hire purchase agreements related rules and formats.

Unit 3: FITNESS OF VEHICLES

Need of fitness check, certificate of fitness , procedure of issue of fitness certificate, Authorized testing stations, Duration of letter of authority, Registration and control of authorized testing station, supervision of authorized testing stations., related rules and formats.

Unit 4: CONTROL OF TRANSPORT VEHICLES

Tourist permits, procedure and fee for tourist permit, National permit, form contents, and duration of authorization, Age of motor vehicle for national permit, filing of returns by national permit holder.

Unit 5: RULES REGARDING CONSTRUCTION, EQUIPMENT AND MAINTENANCE OF MOTOR VEHICLE-

Introduction, need of regulation of specification of vehicles and their components, rules regarding overall dimensions, size, nature and condition of tyres, brakes, steering gears, safety glass and wind screen wipers, various lights, smoke, spark, speed governors, noise reduction, safety devices for driver, passengers and road users.

Unit 6: CONTROL OF TRAFFIC AND RULES FOR ROAD REGULATIONS

Signals and additional safety measures for motor vehicle, rules for vehicle travel on roads, Traffic signs, obligatory declaration on vehicle body. Traffic police and its duties.

Unit 7: VEHICLE INSURANCE-

Need of insurance, meaning of insurance vehicle insurance, scope and limitation of vehicle insurance, insurance governing authority Insurance companies, fee for insurance of various types of vehicles, salient feature of any vehicle insurance agreement, claims, Procedure for claim settlement, insurance surveyors and their role in claim settlement, rate of compensation on various types of vehicle component, damages, vehicle insurance norms issued by IRDA, Rules and formats.

Unit 8: MOTOR VEHICLE INSURANCE AGAINST THIRD PARTY RISK

Introduction , meaning of third party insurance, first, Second and Third parties, Procedure and formats for T.P.I. Insurance certificate and cover notes, authorized insurers, claims

procedure for settlement , rates of compensation on various types of third party injuries, norms issued by IRDA related rules .

Unit 9: MOTOR VEHICLE ACT- Introduction, scope of Act, general provisions for punishment of offences various important offences, power of arrest without warrant, power of police officer to impound documents, power to detain vehicle in special cases, restriction on conviction, punishment for various important offences.

REFERENCE BOOKS

1. Motor vehicle Rules by authorized Publishers.
2. Motor Vehicle Act by Authorized Publishers.
3. Norms and procedure by I.R.D.A. regarding vehicle insurance.

Unit 1: TRACTORS

History & development of tractors, Manufacturers in India, Uses of tractors, Types of tractors, Lubrication system, Cooling system, Transmission system, Power take off shaft, steering system, Tractors efficiency, Types of tyres, Tractors braking system.

Unit 2: AGRICULTURE IMPLEMENTS

Introduction, Trailer & Mounted Implement machine, Advantage, Implements, Types of Implements.

Unit 3: CONSTRUCTION EQUIPMENTS

Introduction, Classification, Constructional features of Various construction equipments, Uses & operation of Dumpers, Scrapers, Shovels, Road Rollers, Excavators, Bulldozers, Cranes, Rippers.

Unit 4: DOZERS

Introduction, Types of dozers, various components of Dozers, transmission in dozers, suspension system, types of mould board, dozer equipment & hydraulic system.

Unit 5: ROLLERS & COMPACTORS.

Introduction, types of rollers, various manufacturers in India, Transmission System, steering system, Braking system, Applications.

Unit 6: NON CONVENTIONAL VEHICLES.

Battery operated vehicles, gas turbines, fuel cell their construction & working. CNG, LPG, solar vehicles. LPG & Solar vehicles, hybrid vehicles.

REFERENCES

1. Auto Engg. by C. P. Nakara
2. Tractor Mechanics by R. B. Gupta
3. Maintenance & Repairs by S. C. Jain & C. R. Rai
4. Truck & Tractor Guide by Front D. Graham
5. Manuals of Earth moving Equipments.

Unit 1: CONCEPT OF REFRIGERATION

Basic Air conditioning system – Location of air conditioning components in a car -schematic layout of a refrigeration system, concept of heat pump and heat engine, C.O.P., second law of thermodynamics applicable to refrigeration, reversed carnot cycle, bell colemen cycle, calculation of work done required, Net refrigeration effect, C.O.P using simple formula only, Refrigeration, Properties of an ideal refrigerant and various commercial refrigeration

Unit 2: VAPOUR COMPRESSION REFRIGERATION

Introduction to vapour compression cycle, calculation of work done required and net refrigeration effect, C.O.P., study of various components of vapour compression refrigeration system. Simple numerical problems based on use of formula only.

Unit 3: AIR CONDITIONING

Air conditioning, its meaning, need for air conditioning Properties of air to be regulated during air conditioning, human comfort, environmental factor for human comfort, explanation of terms related to air conditioning. Air conditioning process (psychometric charts, simple numerical problems based use of formula only).

Unit 4: VEHICLE AIR CONDITIONING SYSTEM

Various methods of vehicle air conditioning regarding working principle and methods of working, study of components, layout of a vehicle air conditioning system, Heat insulation, methods of heat insulation, arrangements for heat insulation, important parameters to be checked and regulated for proper and smooth operation. Simple numerical problems based on use of formula only for calculation of power.

Unit 5: MAINTENANCE OF VEHICLE AIR-CONDITIONING SYSTEM

Various types of common troubles in VACS, Possible causes for each trouble & possible remedies, Routine and scheduled checkups for VACS, precautions to be taken up while maintaining the VACS, gas charging procedure

LIST OF EXPERIMENT

- 1 Handling and use of tools such as - Tube cutter, tube bender (spring and mechanical Type. Flaring and swaging tool, wrenches, pliers, Service and valves, service gauges, preparation of soldered and brazed joints
- 2 Study of packaged/window/air conditioner with respect to
 - a) Capacity
 - b) Electric Circuit
 - c) Air flow path.
 - d) Specification of main components used.
 - e) Refrigerant used.
- 3 Leakage detection using
 - a) Soap and water
 - b) Halide Torch
 - c) Vacuum Method
 - d) Pressure method
- 4 Operating service valves and gauge manifold.
- 5 Removing air from Refrigeration system before Charging
- 6 Removing Refrigerant from system

7 Charging / recharging the vehicle air conditioning Systems

8 Testing refrigeration and Air conditioning System, control components for proper functioning and replacement:

a) Capacitor

b) Starting and running windings of hermetically Sealed compressor.

c) Overload.

d) Relay

e) L P and H P

f) Thermostat

REFERENCES

1. Refrigeration and air conditioning by Sarrao and Gabbi

2. Refrigeration & air conditioning by C. P. Arora.

3. Automotive air conditioning by William H. Crouse & D.L . Anglin, McGraw-Hill Inc.

4. Automotive air conditioning, Paul Weisler, Reston Publishers

Unit 1: INTRODUCTIUON TO AUTOMOTIVE FUELS

Sources of petroleum fuels Gasoline, Diesel, LPG, CNG, alcohols etc.

Unit 2: FUELS FOR GASOLINE ENGINES

Process of combustion in Gasoline Engines, knocking in gasoline engines, Highest Useful Compression Ratio, Octane number, factors responsible for knocking, methods to reduce knocking, delay period of fuels, ignition advance, flame propagation, factors affecting flame propagation, Anti knock agents, effect of high octane number fuels on engine, properties of gasoline, formation of gum, ISI standards for gasoline's, important characteristics of gasoline

Unit 3: FUELS FOR DIESEL ENGINES

Process of combustion in Diesel Engine, Comparison of Diesel combustion with petrol combustion, Diesel knock, Delay period factors responsible for diesel knock, difference between diesel and petrol knock. CCR, Doped fuel properties of Diesel fuels, ISI standards for Diesel fuels.

Unit 4: ALTERNATIVE FUELS

Introduction, Gasohol, methyl alcohol, L.P.G., C.N.G, LPG, Bio-diesel their important properties and specific advantages over conventional fuels.

Unit 5: LUBRICATING OILS

Introduction , functions of lubricating oil, properties of lubricating oils such has viscosity, resistance to carbon formation, resistance to oil oxidation, corrosion and rust resistance, foaming resistance, Detergent dispersants, Extreme pressure resistance. Viscosity index, viscosity numbers, multiple viscosity oils, synthetic oils, sludge formation in oils, prevention of sludge formation. Service rating of oil, ISI standards for Automotive lubricants, S. A. E. rating of various oils

Unit 6: GREASES

Introduction, composition and formation, properties of greases, field of applications, classification of greases such as wheel bearing greases, universal joint greases, chassis greases, multipurpose greases, extreme pressure greases, service rating of greases, ISI standards for various automotive greases. S. A. E. rating of various greases.

Unit 7: BRAKE FLUIDS

Introduction, characteristics of good brake fluid,service rating of brake fluid, ISI standards for brake fluids.

Unit 8: GEARBOX LUBRICANTS

Introduction, function of lubricant, composition of lubricants, service ratings, ISI Standards and SAE Ratings.

LIST OF EXPERIMENTS

- 1 To determine the flash point of given petroleum fuel.
- 2 To determine the fire point of given petroleum fuel.
- 3 To determine the viscosity of given lubricant.
- 4 To determine the pour point of given lubricant.
- 5 To plot the fuel evaporation characteristics for given petroleum fuel.

REFERENCES

1. Automotive Mechanics by W. H. Crouse
2. Internal Combustion Engines by Sharma and Mathur
3. Automobile Engineering by R. B. Gupta
4. Automobile Engineering Vol I and II by K. M. Gupta
5. Fuels and Lubricants by A. Lahiri
6. Lubricants and Lubrication by S, N, Sadhu and Sher Singh
7. SAE Jouranals
8. Tribology Journals

The following points, concerning the project should be noted:

1 A record of all calculations, drawings and designs must be kept.

2 Student will work either individually or in a group of 2, 3, or

3 A Written report must be available to the supervisor at the end of the course.

This report should be neatly written and produced in a suitable folder which bears the name of the polytechnic, the title of the project and the name of the contributor and the dates of the work. Although the reports will obviously vary from project to project, yet, they should in general, conform to the following pattern:

(a) Summary: A summary of the report which should not exceed one page in length.

(b) Index: The report should be logically indexed.

(c) Introduction: This should introduce the reader to the objectives of the exercise.

(d) Main body: this will vary considerably from project to project and will contain all design calculations, drawings, results etc.

(e) Conclusion: This will state the main conclusions of the exercise.

(f) Bibliography: A list of all references used.

In general, you will find that a well presented brief concise and logical report will score a higher assessment than a badly presented, lengthy muddled and illogical report.

4 The examiners will look for the following points when assessing your project:

(a) The way in which you have applied existing knowledge to your project.

(b) Mental skill in manipulations of formulas etc.

(c) The quality of physical skills in the manufacture and assembly of apparatus and test pieces etc.

(d) Analysis of test results to produce a conclusion.

(e) The ability to produce a complete project from all the individual elements.

(f) Skill in evaluating between, for instance, various design alternatives.

(g) The way in which the initial specifications are interpreted and translated in to a finished project.

(h) The quality of the creative aspect of the design to meet the given specifications.

(i) The quality of the written content of the report.

(j) The quality to the graphical content of the report.

OBJECTIVES:

THE STUDENTS WILL BE ABLE TO:

1. Developing working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

1 SOCIAL SKILLS

SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY

2 Swot Analysis – Concept, How to make use of SWOT

3 Inter personal Relation- Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.

4 Problem Solving

I) STEPS IN PROBLEM SOLVING- identify and clarify the problem, information gathering related to problem, evaluate the evidence, consider alternative solutions and their implications, choose and implement the best alternative, review

II) Problem solving technique.(any one technique may be considered)

- 1) Trial and error, 2) Brain storming, 3) Lateral thinking

5 Presentation Skills

Body language -- Dress like the audience, Posture, Gestures, Eye contact and facial expression.

Presentation Skill- Stage Fright, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board

6 Industrial Visits Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. **TWO** industrial visits may be arranged in the following areas / industries :

- i) Manufacturing organizations for observing various manufacturing processes including heat treatment ii) Material testing laboratories in industries or reputed organizations iii) Auto workshop / Garage iv) Plastic material processing unit v) ST workshop / City transport workshop
- ii)

7 Lectures by Professional / Industrial Expert be organized from Any

Three of the following areas : i) Use of a plastics in automobiles. ii) Nonferrous Metals and alloys for engineering applications iii) Surface Treatment Processes like electroplating, powder coating etc. iv) Selection of electric motors. v) Computer aided drafting. vi) Industrial hygiene. vii) Composite Materials. viii) Heat treatment processes. ix) Ceramics

8 Individual Assignments:

Any two from the list suggested

a) Process sequence of any two machine components. b) Write material specifications for any two composite jobs. c) Collection of samples of different plastic material or cutting tools with properties, specifications and applications. d) Preparing models using development of surfaces. e) Assignments on bending moment, shear forces, deflection of beams and torsion chapters of strength of material. f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable. g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes. h) List the various properties and applications of following materials – a. Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers.

OR

Conduct ANY ONE of the following activities through active participation of students and write report

- i) Rally for energy conservation / tree plantation. ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc. iii) Conduct aptitude, general knowledge test, IQ test iv) Arrange any one training in the following areas : a) Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances.

9 Group discussion and Interview technique – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are - i) Sports ii) Current news items iii) Discipline and House Keeping iv) Current topics related to Electrical engineering field.

Interview Technique Necessity, Tips for Handling Common Questions

10 Working in Teams

Understand And Work Within The Dynamics of A Groups. Tips to Work Effectively In Teams, Establish Good Rapport, Interest with others and work, Effectively with Them to Meet Common objectives, Tips to Provide and Accept Feedback in A Constructive and Considerate Way, Leadership In Teams, Handling Frustrations in Group.

11 Task Management -Introduction, Task identification, Task planning, organizing and execution, Closing the task

Assignment: (Any Eight Assignments)

1) SWOT analysis: - Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT. a) Your past experiences, b) Achievements, c) Failures, d) Feedback from others etc. 2) undergo a test on reading skill/memory skill administered by your teacher. 3) Solve the puzzles. 4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc. (One activity per group) 5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher. 6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.##### 7) Conduct an

interview of a personality and write a report on it. 8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed 9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

MINI PROJECT ON - task management. Decide any task to be complete Stipulated time with the help of teacher. Write a report considering various steps in Task management.

Reference Books

- 1 Marshall Cooks Adams Time management Viva Books
- 2 E.H. Mc Grath , S.J. Basic Managerial Skills for All Pretice Hall of India, Pvt Ltd
- 3 Allen Pease Body Language Sudha Publications Pvt. Ltd.
- 4 Lowe and Phil Creativity and problem solving Kogan Page (I) P Ltd
- 5 by Adair, J Decision making & Problem Solving Orient Longman
- 6 Bishop , Sue Develop Your Assertiveness Kogan Page India
- 7 Marion E Haynes Make Every Minute Count Kogan page India
- 8 Steven L McShane and Mary Ann Glinow Organizational Behavior Tata McGraw Hill
- 9 Stephen P. Robbins Organizational Behavior Pretice Hall of India, Pvt Ltd
- 10 Michael Hatton Presentation Skills (Canada – India Project) ISTE New Delhi
- 11 Stress Management Through Yoga and Meditation Sterling Publisher Pvt Ltd
- 12 Richard Hale ,Peter Whilom Target setting and Goal Achievement Kogan page India
- 13 Chakravarty, Ajanta Time management Rupa and Company
- 14 Harding ham Working in Teams A Orient Longman

INTERNET ASSISTANCE

1. <http://www.mindtools.com>
2. <http://www.stress.org>
3. <http://www.ethics.com>
4. <http://www.coopcomm.org/workbook.htm>
5. <http://www.mapfornonprofits.org/>
6. <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
7. <http://eqi.org/>
8. <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
9. <http://www.mapnp.org/library/ethics/ethxgde.htm>
10. http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11. <http://members.aol.com/nonverbal2/diction1.htm>
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. <http://snow.utoronto.ca/Learn2/modules.html>
14. <http://www.quickmba.com/strategy/swot/>