



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

SYLLABUS

For

DIPLOMA in AUTOMOBILE ENGINEERING

(PART TIME)

(SECOND YEAR, 3rd 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 (Second Year, 3rd Sem)

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Unit 1: INTRODUCTION TO COMPUTERS:

Basic Concepts Generations of Computers, Overview of computer Systems, Classifications of Computers, Characteristics of Computers, Applications of Computers. Numbers System & Codes, Decimal, Binary, Octal, Hexadecimal, Conversions from one system to other Binary Coded Decimal & ASCII Code, Computer Hardware, Input Devices Keyboard, Mouse, Trackball, Joystick, Scanner, OMR OCR Bar-Code Reader, MICR, Digitizer, Card Reader, Voice Recognition, Web Cam, Video Cameras, Etc. Output Devices Monitors, Printers : Dot matrix, Inkjet & Laser, Plotters, Commuter, Output Micro Film (COM), Multimedia Projector, Speech Synthesizer, Dumb, Smart & Intelligent.

Unit 2: OPERATING SYSTEM

Overview of DOS, Internal Commands External Commands, Windows Operating System, Overview of different versions of Windows Characteristics and Facilities of Windows, Terminologies of Windows - Desktop, Icon, Menu etc. Components of Desktop. Working with Files and Folders. Windows Utilities and Accessories – Notepad, WordPad, Paintbrush, Windows Explorer, Calculator, Introduction to Linux, An overview of Linux, Basic Linux elements System Features Software, Features File structure, Linux H/W & S/W requirements.

Unit 3: WORD PROCESSING

Saving, Closing, Opening of documents , Selecting text, Editing text, Finding and replacing text, Printing documents, Merge Documents, Character and paragraph Formatting, Page Design and layout, Spell Check, Creating Tables and Charts, Handling Graphics.

Unit 4: SPREADSHEET PACKAGE:

Spreadsheet concept – Need, advantage, Terminology like cell, row, column etc., Working with Spreadsheet – Creating, Saving, Editing and printing, Entering data – Entering number, text, date, time etc., Selecting cells – Cut, copy, paste date, Editing Worksheet data, Formatting – Text and Cells, Applying border shading, background patterns, conditional formats, positioning cells, formatting numbers, text, Date, time, Creating formulas- Entering, Editing, Using Functions, controlling calculations, Working with Charts- Creating charts, Adding & changing text, changing the view and display, types of charts.

Unit 5: PRESENTATION SOFTWARE:

Introduction, Presentation design tools, Presentation terminologies, Creating, Opening and Saving Presentation, Working with different views, Creating and Organizing slides Adding and Formatting text in slides, formatting paragraphs, Adding drawings and objects Creating special effects, Working with table and charts, Printing Presentation.

Unit 6: DATABASE:

Introduction – need, Characteristics and terminologies of database, Types of database – relational, Hierarchical and Network, Basic entities – Tables, records, Data types, Data Validation and constraints, keys relation between tables, Query – Select,

Insert, Update, and Delete. Forms – Creating forms, Forms controls, Report Designer- Customize formats, grouping reports.

Unit 7: COMPUTER COMMUNICATION & NETWORKS

Information Networks - The Technology of Workgroup Computing Types of network, Network topology, Network components Data Communication - Introduction to Data Communication, Types of Data, Transmission media Internet and E-mail Internet Basics Websites- Applications, terminologies, naming conventions. Web Browsers- Types, Navigation and tools E-mail – concept, terminologies, mailing services provider, advantages comparison with Conventional mailing, Search engine – concept, search engine websites, searching methods.

LIST OF EXPERIMENTS

1. Study of various components of computer like CPU, keyboard, mouse, monitor, printer, CVT and storage devices.
2. Internal and external commands of DOS.
3. Using Windows operating system, study of desktop, control panel, accessories and settings. File management in windows explorer, Study of WordPad, NotePad, Paint Brush, Calculator etc.
4. Study of Linux operating system.
5. Study of MS-word – opening and saving of documents, formatting, editing and spell check, find and replace, printing, merging. Creating Table, Charts and Graphics.
6. Study of Spreadsheet – creating, saving, editing and printing. Entering data, selecting cells, formatting text, applying border shades and backgrounds, creating formulas, creating charts.
7. Study of Power Point – creating, opening, editing and saving of slides. Adding and formatting text, creating animations, working with images and special effects. Printing presentation.
8. Study of MS Access– creating, saving, editing and printing of tables. Managing relationships, writing queries e.g. SELECT, UPDATE, DELETE, INSERT. Forms designing and report printing.
9. Study of Web Browser and mailing programs.

REFERENCES

1. A First Course in Computers - S . Jaiswal Golgotha Publication
2. Computers & Application, - Slotnick, Butterfield, Colantonio and Kopetzky C.C. Health & Company
3. Computers Today, - Suresh K. Basandra Galgotia Publication
4. The Complete Guide to Microsoft Office Professional, - Ron Mansfield Sybex /BPB Asian Edition
5. Inside IBM PC - Norton Peter
6. Hardware Bible - BPB Publication
7. Computer Hardware - Osborne Series
8. DOS & Utilities - BPB Publication
9. Learning Windows in 24 Hours - Sam Techmedia
10. Multimedia Making it work -Tay Vaughan Tata McGrawHill

Unit 1: INTRODUCTION TO DRAWING INSTRUMENTS:

Introduction of drawing instruments, materials and their uses, Applications of mini drafter, Applications of compass and divider, Applications of French curves and spline, Pencils grades and their uses, Designation and sizes of drawing sheet and drawing board

Unit 2: PLANNING AND LAY- OUT OF DRAWING SHEET:

Planning of drawing sheet as per I.S.: 696-1972 (SP 46: 1988), This should include, Margin, Title Block, Zoning, Revision panel, Folding marks, Numbering of sheet, Bracket fan, fan regulator, battery and earth point, Electronics components- Diode: Zener, varactor, Scotty, step recovery, light emitting diode, (LED), PNP and NPN transistors, resistance, capacitor, Inductors (fixed and variable both), IC (8pin and 14pin) SCR, TRIAC, DIAC, UJT, FET, MOSFET, LOGIC GATES - Sanitary fittings- showerhead, wall lavatory basin, corner,

Lavatory basin, urinal stall, kitchen sink, Indian type WC, Water closets (Asian pan, urissapan, Anglo-Indian, European) - Building -single and double swing doors and windows. Mechanical components- Internal and external threads, slotted head, Square end and flat, radial arms and ribs, serrated shaft, splined shaft, Chain wheel, bearing, straight and diamond knurling, Compression and tension spring, leaf spring (with and without eye), Spur and helical gear

Unit 3: CONVENTIONAL REPRESENTATION

Conventional representation of the following as per BIS practice, Common Engineering materials, Electrical installations and fittings, Main switches, (lighting and power), socket outlets (3 pin 5AMP, 3pin15AMP), bell, buzzer, loud speaker, Aerial, ceiling fan, exhaust fan, Bracket fan, fan regulator, battery and earth point. Electronics components, Diode: Zener, varactor, Scotty, step recovery, light emitting diode (LED), PNP and NPN transistors, resistance, capacitor, Inductors (fixed and variable both), IC (8pin and 14pin) SCR, TRIAC, DIAC, UJT, FET, MOSFET, LOGIC GATES Sanitary fittings- showerhead, wall lavatory basin, corner, Lavatory basin, urinal stall, kitchen sink, Indian type WC, Water closets (Asian pan, urissapan, Anglo-Indian, European), Building -single and double swing doors and windows, Mechanical components- Internal and external threads, slotted head, Square end and flat, radial arms and ribs, serrated shaft, splined shaft, Chain wheel, bearing, straight and diamond knurling, Compression and tension spring, leaf spring (with and without eye), Spur and helical gear

Unit 4: LINES, LETTERING AND DIMENSIONING:

Introduction of type of lines and their applications, Single stroke vertical, inclined letters (capital and lowercase) and numerals, Dimensioning: Elements of dimensioning- dimension line, extension line, arrowhead And leader line, Dimensioning system – Aligned and unidirectional, Dimensioning of Arcs and Circles, Angular Dimensioning, Dimension of counter sunk and counter bore.

Unit 5: GEOMETRICAL CONSTRUCTIONS AND ENGINEERING CURVES :

Divide a line into any number of equal parts by parallel line method, Bisecting of line and angle, Construction of triangles and polygons, Introduction of conic sections (curves), Construction of Ellipse by Eccentricity and Concentric circles methods, Construction of Parabola by Eccentricity and Rectangle method, Construction of Hyperbola

by Eccentricity method, Construction of Cycloid, Construction of Involute of circle and polygon, Construction of Archimedean Spiral of any number of convolutions.

Unit 6: SCALES:

Introduction of scales and their applications, Concept of reducing, enlarging and full size scale, Classification of scales – plain, diagonal, vernier, Scale of chord and comparative scales, Definition of R.F, Construction of plain and diagonal scales

Unit 7: THEORY OF PROJECTION AND PROJECTION OF POINTS, LINES AND PLANES

Definition of various term associated with theory of projection, Planes of projection, Quadrants, first & third angle projection method, Projection of points in all the four quadrants, Projection of lines,

1. parallel to HP and VP both.
2. perpendicular to one plane and parallel to other.
3. Inclined to one plane and parallel to other.
4. knowledge of projection of line inclined to both the planes

(No practice required)

Projection of planes

1. Perpendicular to HP and VP both
2. Perpendicular to one plane and parallel to other
3. Inclined to one plane and perpendicular to other.
4. Knowledge of projection of plane inclined to both the planes

(No practice required)

Unit 8: PROJECTIONS OF SOLIDS:

Projection of cylinder, cone, prism and pyramid, Under the following conditions:

1. Axis parallel to HP and VP
2. Axis perpendicular to HP and parallel to VP
3. Axis perpendicular to VP and parallel to HP
4. Axis inclined to HP and parallel to VP.
5. Axis inclined to VP and parallel to HP.
6. Axis inclined to both HP and VP (No Practice required)

Unit 9: SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES :

Section of cone, cylinder, prism and pyramid, (Solid resting on its base in the HP i.e. the Axis perpendicular to HP and parallel to VP) in the following cases:

1. Section plane parallel to HP and perpendicular to VP
2. Section plane parallel to VP and perpendicular to HP.
3. Section plane inclined to HP and perpendicular to VP.
4. Section plane inclined to VP and perpendicular to HP.

Drawing True shape of section, Introduction to development of lateral surface of solids- Cone, Cylinder, Prism and Pyramids (Simple and truncated), Under the condition – solid resting on its base in the HP and axis, Perpendicular to HP and parallel to VP, Development of funnel and elbow.

Unit 10: INTERSECTION OF SURFACES

Intersection of following cases – Cylinder to cylinder and Prism to prism (With their axis intersecting and perpendicular to each other.)

Unit 11: ORTHOGRAPHIC PROJECTIONS & FREE HAND SKETCHING :

Principles of orthographic projections, Identification of necessary views and superfluous view, Selection of front view, Preparation of necessary orthographic views of simple objects, From given pictorial views, Dimensioning of orthographic views as per standard practice, Free hand sketches of simple objects (Using Pencil, Eraser & Paper only)

Unit 12: ISOMETRIC VIEWS

Concept of isometric projection and isometric view (Isometric Drawing), Construction of isometric scale, Construction of isometric view of polygon and circle, Construction of isometric view of cone, cylinder, prism and pyramids, Construction of isometric view of simple objects from given orthographic views.

References

- [1] A text book of Applied Mechanics – R.S. Khurmi , S.C. Chand & Co. , New Delhi
- [2] Applied Mechanics – I.B. Prasad, Khanna Publishers, New Delhi
- [3] Applied Mechanics (Hindi) – R.S. Jog, Anand Publishers, Gwalior
- [4] Applied Mechanics (Hindi) – A.R. Page, Deepak Prakashan, Gwalior

List of Experiments

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid of plane lamina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
8. Determination of mechanical advantage, velocity ratio and efficiency of the following lifting machines
 - 8.1 Simple wheel and axle
 - 8.2 Differential wheel axle
 - 8.3 Single purchase crab
 - 8.4 Double purchase crab
 - 8.5 Simple pulley block
 - 8.6 Simple screw jack
- 9 Measurement of B.H.P. of an engine using rope break dynamometer

Unit 1: Requirement of Engineering materials, mechanical properties and their testing:

Introduction to engineering materials, classification of engineering materials and their properties. Mechanical properties of materials, destructive including Tensile test, compression test, hardness test, impact test fatigue test, endurance limit, bending test, shear test and non- destructive testing methods.

Unit 2: Structure of Solid materials:

Classification amorphous and crystalline states, unit cells and crystal structure (B.C.C., F.C.C. and H.C.P) allotropy. Crystal imperfection and their effects on properties

Unit 3: Solidification of Metal and ingot structure: Process of nucleation and grain growth, ingot solidification, dendritic and columnar structure, segregation of impurities, grain and grain boundaries.

Unit 4: Equilibrium Phase Diagrams and Phase Transformation :

Equilibrium of phase Diagrams : Plotting of equilibrium diagrams, interpretation, phase rule and lever rule and its application Phase transformations – Eutectic Eutectoid, Peritectic and Peritectoid

Unit 5: Practical Metallography :

Preparation of specimen, selecting the specimen, mounting the specimen, grinding , polishing, etching and etching reagents. The metallurgical microscope. Use and care of microscope.

Unit 6: Iron- Carbon Equilibrium System :

The complete iron carbon diagram and its interpretation. The solidification and cooling of various carbon steels, structures produced, correlation of mechanical properties with carbon content.

Unit 7: Heat Treatment of Steels:

Objective of heat treatment, thermal processes- annealing, normalizing, hardening and tempering. Hardening process : Surface hardening, flame hardening, case hardening methods, their scope, limitations and advantages, quenching mediums and their effect on hardness, Hardening defects due to improper quenching, hardenability, Jominy end quench test and interpretation of its results. T.T.T. curves interpretation and use, Isothermal heat treatment processes -martempering, austempering, spheroidising and patenting

Unit 8: Ferrous Metals and Alloys :

Classification, types of cast irons their properties and uses, alloy cast-irons, various alloying elements used, their effects on properties and uses. Classification, composition and uses of plain carbon steels, effect of impurities, Alloy steels –various alloying elements, Their effects on properties and uses. Alloy steel classification. Tool Steel: Typical compositions, requirements of tool steels, high speed steel, high carbon steel. Standardization of steels. Designation of steels as per B.I.S. codes.

Unit 9: Non- Ferrous Metals and Alloys:

Copper: Its Properties and uses, Cooper Bases Alloys: Brasses, their classification, composition, properties and uses, designation of copper alloys as per B.I.S. Aluminum its properties and uses, Aluminum Alloys: Their composition, Classification, properties and uses. Designation of Al- alloys as per B.I.S, Zinc, Nickel and lead their alloys properties and uses Bearing alloys - their composition and field of application.

Unit 10: Non- Metallic Materials:

Introduction to Ceramic Refractory, Rubbers Insulators and Lubricants

Unit 11: Powder metallurgy:-

Introduction and application. Description of process, manufacture and blending of metal powder compacting and sintering.

Unit 12: Metal Preservation:

Corrosion meaning various mechanism effect of corrosion, methods of minimizing corrosion

Unit 13: Non- Ferrous Metals and Alloys:

Copper: Its Properties and uses Cooper Bases Alloys: Brasses, their classification, composition, properties and uses, designation of copper alloys as per B.I.S. aluminum its properties and uses. Aluminum Alloys: Their composition, Classification, properties and uses. Designation of Al- alloys as per B.I.S, Zinc, Nickel and lead their alloys properties and uses Bearing alloys - their composition and field of application.

Unit 14: Non- Metallic Materials:

Introduction to Ceramic Refractory, Rubbers Insulators and Lubricants

LIST OF EXPERIMENTS

1. Preparation of micro specimen.
2. To study micro structural characteristics of gray cast iron white cast iron and malleable cast iron.
3. To study effect of normalising, annealing on the hardness and microstructure of high carbon steel.
4. To study the effect of carbon and temperature on hardening of steel.
5. To study the effect of temperature on the properties during tempering of steel.
6. To study the effect of quenching media on hardness of steel.
7. To study the carbonizing and case hardening of steel.
8. Joining hardenability test and its industrial use.
9. To Study the microstructure of some important brasses and bornzes.
10. To observe the micro structural characteristics and other properties of various cast irons and prepare a report there of, for industrial uses.

Reference book:

1. Engineering physical Metallurgy-By Prof. Y Lakhtin MIR Publishers Moscow
2. A Text Book of Material Science and Metallurgy by O.P. Khanna.
3. Material Science and Process. by S. K. Hazia Choudhry
4. Mechanical Metallurgy by Dieter (Tata Mcgrawhill)
5. Materials For Engineers by M.H.A. Kempsty
6. Introduction to Material Science And Engineeringby K.M. Ralls, T.H. Courtney, John Wuff (Wiley Eastern New Delhi)
7. Physical Metallurgy Principles by Read Hill (Affiliated East- West Press Pvt. Ltd. New Delhi.)
8. Engineering Metallurgy by R. Higgins (ENS).
9. Materials Science by B.S. Narang (Pub. CBS pub. & Distributions New Delhi)
10. Padarth Prodyogiki (Hindi) by P.N. Vijayvergiya (Deepak Prakashan, Gwalior) .

Unit1: INTRODUCTION:

Types of chassis layout with reference to power plant locations and drives.

Unit 2: TRANSMISSION UNITS:

Need of transmission system, Features of transmission components **CLUTCH:** - Requirements of clutches - Principle of friction clutch - Types: Cone clutch, Single-plate clutch, Diaphragm spring clutch, Multi plate clutch, Centrifugal clutches, Electromagnetic clutch. Need of Fluid coupling – Principle, construction & working of fluid coupling. **GEAR BOX:** - Requirements of Gear boxes, Different types of gear boxes, construction & working of Sliding mesh, Constant mesh & synchromesh gear box. Transfer case assembly. Introduction to Torque converter, Hydrostatic transmission.

Unit 3: DRIVE LINE:

Need of universal joints, fluctuations in angular speed, construction & working of constant velocity universal joints, Need of propeller shaft, its construction & whirling speed. Need of rear axle & its types, construction & working of full floating, three quarter floating and semi floating rear axles.

Unit 4: DIFFERENTIAL ASSEMBLY:

Differential-Its need, purpose & Principles, Theory of sun & Planet gears, Construction & working details of differential Unit, Limitation of differential, Non-slip differential, differential locks, single main gear & dual main gear type.

Unit 5: WHEELS & TYRES:

Types of wheels, load distribution on front & Rear wheels, construction of wheel assembly. Spoked wheel, disc wheel & alloy wheel. Wheel balancing. Construction & material of solid, tubed & tubeless tyres. Types of tyre wear and their causes. Hot & cold retreading. Tyre rotation, Tyre specification and aspect ratio.

LIST OF EXPERIMENTS

1. Study of clutch assembly regarding its construction, components and operation.
2. Study of constant mesh, synchromesh and sliding mesh gear boxes regarding their construction, components and operation.
3. Study of universal joints regarding construction, components and operation.
4. Study of propeller shaft and slip joint regarding construction and operation.
5. Study of differential regarding construction, components and operation.
6. Study of rear axle of a vehicle regarding construction, bearing location, wheel fitting and operation.
7. Study of wheel rims and tires their shape, size and specification.

References

1. Heldt.P.M.- “Automotive Chassis”- Chilton Co., New York-
2. K.K.Ramalingam - “Automobile Engineering” – Scitech Publication, Chennai
3. Steed W - “Mechanics of Road Vehicles”- Illiffe Books Ltd., London-
4. Newton Steeds and Garrot- “Motor Vehicles”- Butterworths, London-
5. Judge A.W- “Mechanism of the Car”- Chapman and Halls Ltd., London-
6. Giles.J.G- “Steering, Suspension and tyres”- Iiiffe Book Co., London
7. Crouse W.H- “Automotive Chassis and Body”- McGraw-Hill, New York

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

As the student has to practice this course in all the six semesters, the guidelines given therein are common and applicable to each semester.

OBJECTIVES:

- To allow for professional development of students as per the demand of engineering profession.
- To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)
- To allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.
- To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.
- To provide time for organization of technical quiz or group discussion or any other group activity.
- To provide time for visiting library or using Internet.
- To provide time for group discussion or solving case studies.
- To provide time for personality development of students.
- To provide time for working for social cause like awareness for environmental and ecology etc.

DETAILED INSTRUCTIONS TO CONDUCT PROFESSIONAL ACTIVITIES:

A. Study hours, if possible should be given greater time slot with a minimum of two hrs/week to a maximum of four hrs/week.

B. This course should be evaluated on the basis of grades and mark sheet of students, should have a separate mention of the grade awarded. There will be no pass/fail in professional activities (PA).

C. Following grade scale of evaluation of performance in PA has been established.

Grades	Level of performance
A	Excellent
B	Good
C	Fair
D	Average
E	Below Expectations

D. Grades once obtained in a particular examination shall become final and no chance of improvement in grades will be given to the students.

E. Assessment of performance in PA is to be done internally by the Institution, twice in a Semester/Term through a simultaneous evaluation of the candidate by a group of three teachers, of the deptt. Concerned. Group of teachers will jointly award the grade to candidate in the assessment. Best of the grades obtained by the student in these two assessments shall be finally taken on the mark sheet of the respective Semester/Term.

Candidate abstaining from the prescribed course work and/or assessment planned at the Institute shall be marked ABSENT in the mark sheet, instead of any grade.

F. While awarding the grades for performance in PA, examining teacher should reach the final consensus based on the attendance, punctuality, interest, presentation skills in seminar on the topic assigned (collection of relevant data, observations, analysis, findings/conclusion) and its written report, awareness of latest developments in the chosen programme of study.

G. Institution shall maintain the record of grades awarded to all the students in PA for a period of 1 year.

H. It shall be mandatory for students to submit a compendium for his PA in the form of a Journal.

I. Compendium shall contain following:

I. Record of written quiz.

II. Report/write up of seminar presented

III. Abstract of the guest lectures arranged in the Institution.

IV. Topic and outcome of the group discussion held.

V. Report on the problems solved through case studies.

VI. Report on social awareness camps(organized for social and environmental prevention).

VII. Report on student chapter activities of professional bodies like ISTE, IE (India), CSI etc.

J. PA is not a descriptive course to be taught in the classroom by a particular teacher. Various activities involved in the achievement of objectives of this course should be distributed to a number of teachers so that the talent and creativity of group of teacher's benefit the treatment of the course content.

These activities should preferably be conducted in English language to maintain continuity and provide reinforcement to skill development.

Small groups shall be formed like in tutorials, group discussion, case studies, seminar, project methods, roll play and simulation to make the development of personality affective.

Treatment of PA demands special efforts, attention, close co-operation and creative instinct on the part of teachers of department concerned. Since this course is totally learner centered, many of the activities planned under this course shall come out from the useful interaction of student, among themselves and with the teachers. The guide teacher/s shall best act as a facilitator of these creative hunts/ exercises, which unfold many of the hidden talents of the students or bring out greater amount of confidence in them, to execute certain activity.