DR. A P J ABDUL KALAM UNIVERSITY, INDORE

SYLLABUS

For

DIPLOMA in AUTOMOBILE ENGINEERING

(PART TIME)

(FIRST YEAR, 2nd 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 (First Year, 2nd Sem)

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Unit 1: Differential calculus:

Define constant, variable, function., Value of the function, Concept of limit of a function. Definition and concept of differential, coefficient as a limit, Derivatives of sum, difference, product, quotient of two functions., Diff. coeff. of function of a function., differential coefficient of implicit function.

Unit 2: Integral Calculus

Definition as a inverse process of differentiation, Methods of Integration, Integration by parts, breaking up into partial fraction, Concept of Definite Integral.

Unit 3: Trigonometry & Matrix:

Partial Fractions, Define a proper, Break a fraction into partial, Allied angles. Trigonometrical ratios of sum and ,difference of angles, Sum and difference of trigometric ratios ,Multiple angles , Definition of Matrix., Types of Matrix, Row, Column, Square, Unit, Upper and lower triangular, Symmetric , Adjoint of a Matrix., Inverse of a Matrix.

Unit 4: Co-Ordinate Geometry:

Co-ordinate System : Cartesian and Polar., Distance, Division, Area of a triangle., Slope of St. Line, Angle between two , Standard and general equation of St.line,. Point of intersection of two st lines.

Unit 5: Statistics:

Measures of Central tendency (Mean, Mode, Median), Measures of Dispersion (Mean deviation, standard deviation)

Unit 6: Vector Algebra:

Concept of Vector and Scalar Quantities., Different types of vectors. Addition and subtraction of vectors, Components of a vector, Multiplication of two vectors, Scalar Product, Vector Product

Reference

1. Mathematics for Polytechnics Vol. I and II- Prepared by T.T.T.I. Bhopal
2. Differential Calculus- Gorakh Prasad
3. Integral Calculus-Gorakh Prasad
4. Co-ordinate Geometry -S.L. Loni
5. Engineering Mathematics- Dr. S.K. Chouksey
6. Mathematical Statistics- Ray and Sharma
7. Higher Engineering- B.S. Grewal

Unit 1: Composition and Resolution of Forces:

Definition , Effect, characteristics of force, System of Forces, Principle of Transmissibility of Forces, Concept of Resultant Force, Law of Parallelogram of Forces, Triangle of Forces, Polygon of Forces, Determination of Resultant of two or more concurrent forces (analytically and graphically)

Unit 2: Parallel Forces and Couples:

Classification of Parallel Forces
Methods of finding resultant Force of parallel forces- analytically & graphically, Position of resultant force of parallel forces, Definition, Classification and characteristics of a force Couple, moment of couple

Unit 3: Moments and Their Applications:

Definition, Types and law of moment
Varignon's Principle of moment and its applications, Lever and its Applications, Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL)

Unit 4: Equilibrium of Forces:

Equilibrium of a system of concurrent forces, Conditions and types of Equilibrium, Lami's Theorem and its applications

Unit 5: Centre of Gravity:

Difference between Centroid and Center of Gravity (CG), Centroid of standard plane figures and CG of simple solid bodies, Method of finding out Centroid of composite plane laminas and cut sections, Method of finding out CG of Composite solid bodies

Unit 6: Friction:

Concept and types of friction
Limiting Friction, coefficient of friction, angle of friction, angle of repose, Laws of friction (Static and Kinetic), Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane, Utility / Nuisance value of friction

Unit 7: Simple Lifting Machines:

Concept of lifting Machines, Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation, Reversibility of Machines and condition for self locking machine, Law of Machines, Maximum mechanical advantage and maximum efficiency of machine, Friction in machine (In terms of Load and effort), Calculation of M.A.,

V.R. and efficiency of following machines, Simple wheel and axle, Differential wheel and axle, Single purchase crab, Double purchase crab, Simple screw jack, Different System of simple pulley blocks

Unit 8: Motion of a Particle:

Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration, Motion under constant acceleration/ retardation (equations of motion), Motion under force of gravity, Concept of relative velocity, Definition of projectile, velocity of projection , angle of projection, time of light, maximum height, horizontal range and their determination, Definition of angular velocity, angular acceleration and angular displacement, Relation between linear and angular velocity of a particle moving in a circular path, Motion of rotation under constant angular acceleration

Unit 9: Laws of Motion:

Newton's Laws of motion and their applications

Unit 10: Work, Power and Energy:

Definition unit and graphical representation of work, Definition and unit of power and types of engine power and efficiency of an engine. Definition and concept of Impulse, Definition, unit and types of energies, Total energy of a body falling under gravity

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 lemina 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 roap break dynamometer

Sub Code: PTDC 2106 Sub Name: Environmental Engineering and Safety 6 Credits

Unit 1: Introduction to Environment:

The Biosphere, biotic and abiotic, an aquatic ecosystem, types of pollution, Impact of human being on environment, Impact of environment on human being, Basic approach to improve environmental qualities, role of an environmental engineer.

Unit 2: Air Pollution Sources and Effects:

Standard definition of air pollution, Composition of natural air, Names of air pollutants, Classification of air pollutants, primary and secondary pollutants, Classification of source of air pollutants on different bases, Definition of different types of aerosols. Effect of air pollution on: human health, material properties, vegetation, Major toxic metals and their effects, Major environmental phenomenon e.g., acid rain, global warming, green house effect, ozone layer depletion. Air quality standards, Brief description of air pollution laws.

Meteorological Aspects Of Air Pollutant Dispersion
Meteorological parameters influencing air pollution, Environmental laps rate, temperature inversion, atmospheric stability and adiabatic loss rate, Turbulence, topographical effects, Plume behavior, looping, coning, fanning fumigation, lofting, trapping.

Unit 3: Air Pollution Control Methods and Equipments:

Natural purification processes of air, Artificial purification methods of air, Brief description of following control equipments along with sketch e.g, gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator, Brief description of following processes for the control of gaseous pollutants e. g., absorption, adsorption, condensation, combustion etc.

Unit 4: Water Pollution Sources and Classification:

Water resources, Uses of water, Classification of water Origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, Water pollution laws and standards, Uses of waste water, Classification of waste water, Chemical oxygen demand.

Waste Water Treatment Method

Basic processes of water treatment, Meaning of primary, secondary and tertiary treatment, Flow chart of a simple effluent treatment plant, Theory of industrial waste treatment, Volume reduction, neutralization and proportioning.

Unit 5: Solid Waste Management:

Sources and classification of solid waste, Public health aspects, Disposal methods–open dumping, sanitary, land fill, Incineration, compositing, Potential methods of disposal, Recovery and recycling of paper, glass, metal and plastic.

Noise Pollution and Control

Sources of noise pollution, Units of Noise pollution measurement, Allowable limits for different areas, Problems of noise pollution and measures to control it.

Reference book:

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering"; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunninghan WP and MA; principles of Environment Sc; TMH
11. 11.Pandey, S.N. & Mishra, S.P. Environment & Ecology, 2011, Ane Books, Pvt. Ltd, New

List of Experiments

GROUP A AIR POLLUTION (Any one experiment may be selected from this group)
1. Air monitoring and determination of SPM, CO, Nox, SO2 with high volume sampler.
2. Monitoring of stack gases and determination of SPM, CO, Nox, SO2 with slack monitoring kit.
3 Determination of CO,HC, in exhaust gases from petrol vehicle

GROUP B NOISE POLLUTION
4 Determination of sound pollution in (a) Auditorium (b) Factories (c) Busy roads (d) Theatre (e) TV rooms (select any three situations)

GROUP C INDUSTRIAL WASTE WATER (Any Two experiment may be selected from this group)
5 Determination of BOD/COD ratio in industrial waste water.
6 Determination of Ph and alkanity/ acidity in industrial waste water.
7 Dermination of solids in industrial waste water.
8 Determination of turbidity, cobur,and temperature of industrial waste water.

GROUP D POLLUTION STANDARDS (Any Two experiment may be selected from this group)
9 Study of drinking water standards.
10 Study of effluent standards for water disposal.
11 Study of air pollution standards.

Unit1: Introduction to Work Shop:

General Safety rules of workshop, State the General Safety Measures to be observed in Workshop, State the General house keeping activities, Prepare a list of general safety Rules to be followed in Workshop

Unit 2: Fitting Shop:

Layout of Shop, Sketch & Label Details of shop Layout, Type of jobs produced in fitting shop, Understand the functions of fitting shop, Understand different Metals, Alloys & their Sections, List the Commonly used Metals, Alloys, State at least Five Sections, Shape & Size of Metals, Alloys, Use relevant IS Code for commonly used materials with their samples of different Cross sections, Fitting tools, Know use of fitting tools, sketch various tools & label their parts, Classify fitting tools as marking tools, Clamping devices, striking tools, cutting tools etc, Know the marking out & inspection instruments such as surface plate, marking block, scriber, tri square, bevel protractor etc, Fitting operation: -Use of Various fitting tools, inspection & measuring Instruments. To produce given jobs, Choose correct Shape & Size of Blank for a given drawing, Marking as per drawing using correct method, tools & sequence, Choose correct sequence of operations for the job viz. Sawing, filing, scraping, drilling & Tapping etc, Select appropriate Tools, inspection and measuring instruments.- Clamping the job in correct position in an appropriate clamping device, Perform the operation with appropriate body posture, method & precision, exercising personal judgment of need of the force, Inspect the job as and when necessary, Introduction to screw threads, Know common types of screw threads & the terminology used, Sketch and label details of Metric &Whitworth thread.

Unit 3: Carpentry Shop:

Carpentry shop lay out, Sketch & Label Details of shop Layout, Type of jobs produced in carpentry shop, Understand the functions of carpentry shop, Introduce type of jobs produced by carpenter, Commonly used raw materials: Know commonly used raw materials &their commercially available size, Name various types of raw materials used such as Timber: - logs, planks, battens etc. Ply, Teak ply, block board, sun mica, Formica etc, Carpentry tools: - Know various carpentry tools with their specifications and uses e.g. different saws, chisels, gauges, scales, hammers, tri squares, planners, vice etc, Carpentry Joints:- Introduction of various joints like T, corner, mortise & tennon joints, dovetail, pin, cross half lap joint, etc, Choose correct shape &size of timber blank for a given job drawing.
- **Do marking as per drawing using correct method, tools &sequence.** Identify correct operations e.g. sawing, chiseling, planning, grooving etc, Select appropriate Tool, inspection & measuring Instruments, Clamping the jobs in correct position in an appropriate clamping device, Perform the operation with appropriate body posture, method & precision, exercising personal judgment of need of the force, Inspect for size & quality of finish as and when necessary, Assemble the components produced. Inspect for proper joint quality & take remedial steps.

Unit 4: Black Smithy Shop:

Understand the function of black smithy & forging shop, Layout of Shop, Sketch & Label Details of shop lay out, Know the different jobs produced in smithy shop e.g. round to hexagonal shapes or vice versa J -hook, S- hook, circle, chain etc, Commonly used raw materials: - M.S. Bars of different shapes and size, Smithy Tools: - Know various smithy tools with their specifications e.g. different type of hammers, hot / cold chisel, flatters, tongs, leg vice, swage block, anvils, open hearth and furnaces etc, Preparation of job (any three): J-hook, S-hook, chain, circle, tong, chisel etc, Safety measures: Know the safety regulation in black smithy shop.

Unit 5: Sheet Metal Shop:

Layout of Shop, Sketch & Label Details of shop lay out, Know the different jobs produced in sheet metal shop e.g. Open tray, cylinder, prism, Funnel etc, Commonly used raw materials: -M.S. sheet (black), G.I., M.S.rivets, and aluminum rivet etc, Understand foil, sheet and plate, Tools used:- Different snips, shears, stacks, latter punch, figure punch, Solid punch, hollow punch, mallet, soft hammers, channel, Square bars, std. Sheet gauge, Type of joints and operations: - Introduction of various sheet metal operations &joints e.g. seaming, single seam, double seam, Grooved seam, corner joint, cap joint etc, Preparation of job (any two): - Open tray, cylinder, prism, Funnel etc, Choose correct shape &size of sheet for a given job drawing considering allowances for joint or seam, Do marking as per drawing using correct method, tools and sequence, Identify correct operation e.g. shearing, punching, bending, debarring, folding, strengthening, stamping, riveting, etc, Select appropriate Tool, inspection & measuring Instruments, Holding the job in correct position. Perform the operation with appropriate body posture, method & precision, exercising personal judgment of need of the force, Inspect for proper joint quality and take remedial steps.

Unit 6: Welding Shop:

Layout of Shop, Sketch & Label Details of shop lay out, Know the different jobs produced in Welding shop e.g. Lap joint, single butt, double butt, corner, T joint, etc, Tools & equipments used:-Specifications & use of various tools and equipments used in Welding shop e.g. A.C. welding transformer, Gas welding set, electrode used, chipping hammer, wire brush, shield, gloves, apron etc, Preparation of job: - (any two) Lap joint, single butt, double butt, corner, T joint, etc, Safety measures: - Know the safety regulation in Welding shop.

Unit 7: Plastic Molding

Know the commonly used plastic materials i.e. Thermosetting, Thermo plastic, Sketch & label various parts of bench molding m/c, Production of any product on bench molding m/c.

Unit 8: Revision:

Understand the difference in theory and practice, Explain the importance of skills in production of quality jobs

References

1. Workshop technology vol. I - Hazra & Chaudhary
2. Production technology vol. I- R.C. Patel &C.G. Gupta
3. Production technology vol. I- Dalela
4. Work shop technology vol. I- Raghuwanshi
5. Work shop technology vol. I- Chapman
6. Workshop Vol. I . - P.N.Vijayvargiya (Hindi medium)

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.