



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

SYLLABUS

For

**DIPLOMA CIVIL ENGINEERING, ELECTRICAL
ENGINEERING, ELECTRONICS & TELECOMMUNICATION
& MECHANICAL ENGINEERING**

**(LATERAL ENTRY STUDENTS FROM ITI, REMEDIAL
COURSES)**

(Session July- December 2016)

College of Polytechnic Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Diploma Civil

**Engineering, Electrical Engineering, Electronics &
Telecommunication & Mechanical Engineering**

**List of Subject (Lateral Entry Students from ITI, Remedial
Courses)**

S. No.	Subject Code	Subject name	Page No.
1	DE 1101	COMMUNICATION SKILLS	3
2	DE 1102	PHYSICS	5
3	DE 1103	CHEMISTRY	7
4	DE 1104	MATHMETICS	10
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6	DE 1107	ENVIRONMENTAL ENGINEERING & SAFETY	14

Unit 1: Communication Process and Its Needs:

1.1 How to make communication effective, Barriers in communication, Removal of barriers
1.2 Grammar and vocabulary for correct English usage, Determiners, Prepositions, Auxiliary verbs and subject-verb agreement, Rewrite as directed (change voice, correct form of verbs/ tenses), Vocabulary – One word substitution, words often misused and wrongly spelt.

Unit 2: Passages of Comprehension:

2.1 Prescribed passages (six from existing syllabus)

- i Language of Science
- ii Desalination or Desalting Process
- iii Safety Practices
- iv Non-conventional Sources of Energy
- v Our Environment
- vi Entrepreneurship

2.2 Writing summary, moral and characterization of any one story from the book prescribed.

Unit 3: BUSINESS COMMUNICATION (One Question with Internal Choice):

- 3.1 Principles of effective business correspondence Its parts, mechanics, styles and forms.
- 3.2 Application for job, Bio-Data and C.V.
- 3.3 Letter of Enquiry
- 3.4 Placing order
- 3.5 Complaint

Unit 4: Composition & Translation:

- 4.1 Writing paragraphs of 150 words on topics of general interest i.e. pollution, ragging in college, importance of computers, importance of communication skill, importance of science and technology etc.
- 4.2 Translation (Hindi to English and vice-versa).

Unit 5: Unseen Passages & Precis Writing:

- i Answer the questions based on the passage.
 - ii Give suitable title
- OR
- iii Writing Precis

References

1. English Conversation Practice - Grant Taylor
2. Practical English Grammar - Thomson & Martinet
3. Communication Skills for Technical Students Book – I, Book – II - M/S Somaiya Publication, Bombay
4. Living English Structure- S. Allen
5. English Grammar, Usage, and Composition - Tickoo & Subramanian, S. Chand & Co. Standard Allen Longman.
6. Essentials of Business Communication - Dr. Rajendra Pal & J.S. Korlahalli S.Chand & Sons, New Delhi.
7. Effective Business Communication - M.V. Rodrigues, Concept Pub. Co., New Delhi.
8. Communication for Business - Shirely Taylor, Longman, England.
9. Communication for Engineers and Professors - P. Prasad, S.K.Kataria and sons publications, New Delhi
10. Technical English Book-II, - Somaya Publications, New Delhi

Unit 1: Units & Measurement:

Fundamental and derived units Scalar and vector, Basic requirements to represent vector Symbols, abbreviation, and Proclamation Linear measurement by vernier calipers, screw gauge and spherometer Angular measurement by angular vernier.

Unit 2: Motion:

Motion and its type Linear motion Circular motion Angular velocity and relation with linear velocity Centripetal acceleration, Centripetal and Centrifugal forces Rotatory motion, Axis of rotation, Moment of Inertia, Radius of gyration Kinetic energy of rotation Numerical problems and solution on the topic.

Unit 3: Properties of Matter:

Elasticity: Meaning, definition, stress, strain, Hook's law and elastic limit Surface Tension : Meaning, definition, molecular forces, cohesive and adhesive forces, surface energy, capillary rise and capillary rise method. Viscosity : Meaning, definition, stream line and turbulent flow, critical velocity, Stock's law. Numerical problems and solution on the topic.

Unit 4: Heat:

Heat and temperature, concept of heat as molecular motion Transmission of heat, study state and variable state. Concept of heat capacity, specific heat and latent heat. Calorimeter and its uses. Thermodynamics Relation between heat and work Mechanical equivalent of heat First law of thermodynamics and its application Second law of thermodynamics and its application Carnot cycle. Numerical problems and solution on the topic.

Unit 5: Heating Effect of Current And Thermoelectricity:

Heating effect of electric current: Joule's law, work energy and power in electric circuit, calculation of electric energy. Thermo electricity Seebeck effect and thermoelectric power. Neutral temperature, temperature of inversion and relation between them Thermo electric thermometer and thermo couples. Numerical problems and solution on the topic.

Unit 6: Optics and Optical Instruments:

Refraction, critical angle and total internal reflection, refraction through lenses and problems, Power of lenses Spherical and chromatic aberrations Simple and compound microscope, telescope and derivation for their magnifying power Numerical problems and solution on the topic.

Unit 7: Electrostatics and Electromagnetic Induction:

Coulomb's law, Electric field intensity, potential. Capacity, principle of capacitor, types of

capacitor, combination of capacitors Electromagnetic Induction: Faraday's law, Lenz's law
Self and mutual inductance Transformer and electric motor, Induction coil.

Unit 8: Basic Electronics:

Semiconductors, Types of semiconductors Explanation of conductor, semiconductor and
Insulators on the basis of band theory. P-N junction diode as rectifier.

References

1. Applied Physics Vol. 1 & 2 - Saxena and Prabhakar
2. Physics - TTTI Publication
3. Physics Vol. 1 & 2 - Halliday and Resnic R
4. Engineering Physics - Gaur and Gupta
5. Principle Of Physics - Brij Lal & Subramanyan
6. Physics for Technical Education - Ls Zednov

List of Experiments

1. Refractive index of prism (I-d) Curve
2. Refractive index of prism (spectrometer)
3. Focal length of a convex lens by u
4. Focal length of a convex lens by displacement method
5. Verification of Ohm's law
6. To find out unknown resistance by meter brid
7. To find out internal radius of hollow tube by vernier calipers.
8. To find out volume of given cylinder by screw gauge.
9. Surface tension by Capillary rise method. Coefficient of viscosity
10. Coefficient of Thermal conductivity by searl's method.
11. Verification of Newton's cooling law.

Unit 1: Atomic Structure and Radioactivity:

Discovery of electron, proton, neutron and nucleus. Rutherford's and Bohr's model of an atom. Bohr Burry scheme of filling the electrons in various orbits. Idea of s, p, d, f orbital. Alfa, Beta and Gamma rays, theory of radio activity, Group displacement law, half life period, numerical problems on half life period, fission and fusion.

Surface Chemistry and Its Application

True solution, colloidal solution and suspension, lyophobic and lyophilic colloids, optical and electrical properties of colloids, coagulation, coagulants, idea about gels and emulsions.

Unit 2: Electrochemistry:

Electrolysis, Faraday's laws of electrolysis, Numerical problems on Faradays Law, electroplating of copper and nickel.

Colligative Properties

Osmosis & osmotic pressure, Relative vapour pressure and Raoult's law. Internal energy (enthalpy), Entropy, Entropy fusion free energy, Effect of change in temperature catalysis.

Unit 3: Chemical Bonding:

Nature of bonds, Electrovalent, Covalent, coordinate and hydrogen bond

Metals and Alloys

Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel, General principle of metallurgy, minerals/ ores, ore dressing, roasting, smelting, bassemmerisation, fluxes, purification. Explanation of alloying purposes, methods of alloying, composition and uses of alloy like brass, bronze, duralium, German silver, gun metal, solder, stainless steel, casting and bearing alloy.

Unit 4: Glass, Cement and Refractory

Glass: Basic raw materials for glass, composition and manufacture of glass, varieties of glass and annealing of glass,. Cement: Constituting compounds in cement, Composition of Portland Cement, its manufacture, setting and hardening of cement. Refractories: Meaning, characteristics, use of common refractory materials.

High Polymers, Rubber And Insulators

Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation, Properties and uses of PVC, polyethene, polystyrene, polyamides, polyesters, Bakelite. Synthetic fibers–nylon, rayon, decron, and polyesters. Definition characteristics, classification and properties of insulators. Glass, wool and thermocol.

Unit 5: Lubricants, Paints and Varnishes

Lubricants: Meaning, type and theory of lubricants, properties of a good lubricants, Flash and fire point and cloud point, emulsification number, viscosity. Paints and Varnishes: Meaning, ingredients and characteristics of good paints and varnishes, their engineering application.

Fuels, Fire Extinguishers and Explosives

Classification of fuel, gross and net calorific value, Determination of a solid fuel by bomb calorimeter, octane and octane number, Proximate analysis of fuel, its utility, crude petroleum, products of fractional distillation, Fire extinguishers–Description and use, Explosives–Meaning, types, characteristic and use of explosives. Name Dynamite, lead azide, T.N.T., Picric acid.

Reference books –

1. Physical chemistry – Bahl and Tuli
2. Inorganic chemistry – Satyaprakash
3. Modern text book of applied chemistry – Dr. G. C. saxena, Jain prakashan, indore
4. Applied chemistry - Dr. G. C. saxena, Deepak Prakashan, gwalior
5. Applied chemistry – Shrivastava & Singhal, PBS Publication, Bhopal.
6. Engineering chemistry – UPPAL.
7. Engineering chemistry – Rao and Agrawal
8. Engineering chemistry – P.C. Jain
9. Polymer chemistry – O.P. Mishra
10. Applied chemistry – H.N. Sahni, Deepak Prakashan.

List of Experiments

1. Determine the percentage of moisture content in the given coal sample.
2. Determine the change of viscosity of given lubricating oil with Change in temperature by Redwood viscometer No.1.
3. Determine the change of viscosity of given lubricating oil with Change in temperature by Redwood viscometer No.2.
4. Determine the flash & fire point given lubricating oil by able's closed cup apparatus.
5. Determine the type & extent of alkalinity of given sample of water by N/20 HCl (hydrochloric acid when $P > 1/2 M$).
6. Determination of the chloride ions in given water sample by Mohr's method.
7. To determine the strength (in g/L) of the given unknown strength sodium thiosulfate (hypo) solution by a known strength (5.0000 g/L) N/40 standard cupper sulfate solution.
8. To determine the strength (in g/L) of the given unknown strength sodium thiosulfate (hypo) solution by a known strength (5.0000 g/L) N/40 standard cupper sulfate solution.
9. To determine the strength (in g/L) of ferrous ammonium sulfate ($FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$) by titrating it against standard (1.0 g/L) potassium dichromate ($K_2Cr_2O_7$) solution.
10. Determination of iron content in an iron ore by titrating it against standard N/20 $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$, H_2SO_4 , $FeSO_4$ as an external indicator.

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 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: 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 lapse 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, composting, 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. Cunningham WP and MA; principles of Environment Sc; TMH
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.