



ITM UNIVERSITY

Naya Raipur, Raipur

B.Tech (Bachelor of Technology)

First Year Engineering Syllabus

Second Semester

Common to all branches of Engineering

2017

Second Semester Syllabus

Teaching and Examination Scheme

Subject Code	Subject Name	Teaching Scheme		Examination Scheme				
		Th.+Tut. (L+T)	Pr. (P)	Theory Marks		Term Work (Internal)	Practical (External)	Total
				End Sem. Exam	Internal Assessment			
300201	Applied Mathematics - II	06	-	70	30	-	-	100
300202	Applied Sciences – II	06	-	70	30	-	-	100
300203	Basic Mechanical Engineering	04	-	70	30	-	-	100
300204	Engineering Drawing	04	-	70	30	-	-	100
300205	Logic Building through Computer Programming	04	-	70	30	-	-	100
300206	Environmental Science	04	-	70	30	-	-	100
300207	Basic Workshop Practice II	-	04	-	-	50	100	150
300208	Applied Sciences – II Lab.	-	04	-	-	15	35	50
300209	Basic Mechanical Engineering Lab.	-	02	-	-	15	35	50
300210	Engineering Drawing Lab.	-	02	-	-	15	35	50
300211	Logic Building through Computer Programming Lab.	-	02	-	-	15	35	50
300212	Environmental Science Lab.	-	02	-	-	15	35	50
		28	16	420	180	125	275	1000

Subject Code: 300201

Subject Name: Applied Mathematics - II

Lectures: 6 Hrs/Week

ESE duration: 3 Hrs.

Detailed Syllabus

Topics
<p>Unit – 1 INTEGRAL CALCULUS 1.1 Double integration-definition, evaluation of double integrals, change of order of integration, evaluation of double integrals by changing the order of integration and changing to polar form (Examples on change of variables by using Jacobian's only). 1.2 Triple integration –definition and evaluation (Cartesian, cylindrical and spherical polar coordinates).</p>
<p>Unit – 2 APPLICATION OF INTEGRATION 2.1 Quadrature and rectification for single variable. 2.2 Application to double integrals to compute area, mass, volume. 2.3 Application of triple integral to compute volume.</p>
<p>Unit – 3 DIFFERENTIAL EQUATION AND ITS APPLICATION 3.1 Linear differential equations(review), equation reducible to linear form, Bernoulli's equation. 3.2 Differential equation of first order and first degree-exact differential equations, equations reducible to exact equations by integrating factors. 3.3: Linear differential equation with constant coefficient- complimentary function, particular integrals of differential equation of the type $f(D)y = X$ where X is e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$, x^n. 3.4: Cauchy's homogeneous linear differential equation and Legendre's differential equation, method of variation of parameters.</p>
<p>Unit – 4 SERIES EXPANSIONS FUNCTIONS AND INDETERMINANT FORM 4.1 Taylor's Theorem (statement only) and Taylor's series, Maclaurin's series (statement only). Expansion of e^x, $\sin x$, $\cos x$, $\tan x$, $\sinh x$, $\cosh x$, $\tanh x$, $\log(1+x)$, $\sin^{-1}x$, $\cos^{-1}x$, Binomial series. Indeterminate forms, L-Hospital Rule, problems involving series also. 4.2: Fitting of curves by least square method for linear, parabolic, and exponential. Regression analysis (to be introduced for estimation only)</p>
<p>Unit - 5 PARTIAL DIFFERENTIAL EQUATIONS (PDE) 5.1 Definition of PDE, Solution of PDE, Complete Integral, 5.2 Methods to solve PDE (method of direct integration, Lagrange's equation), solution of non – linear PDE, 5.3 Homogeneous linear partial differential equation with constant coefficient.</p>

Recommended Books:

1. A Textbook of Applied Mathematics, P. N. Wartikar And J. N. Wartikar, Vol –I and II By Pune Vidyarthi Graha.
2. Higher Engineering Mathematics, B. S. Grewal, Khanna Publication
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Limited, 9th Ed.
4. Computational Mathematics By H. K. Pathak : Differential Equations, Sheply Ross, Wiley India.

Subject Code: 300202

Subject Name: Applied Sciences – II

Lectures: 6 Hrs/Week

ESE duration: 3 Hrs.

The contents are distributed into two parts : Engineering Chemistry and Engineering Physics

PART-I

Detailed Syllabus of Engineering Chemistry

Topics
<p>Unit – 1 WATER TREATMENT Chemical analysis of water- Hardness, chloride content, alkalinity- numericals. Ill effect of hard water in steam generation, preventive measures. Water softening processess- Lime-Soda, Ion -exchange and zeolite method with numericals.</p>
<p>Unit – 2 FUELS AND COMBUSTION Fuels -Definition, classification of fuels, calorific value and its units. Determination of calorific value –Bomb calorimeter, Solid fuels : Coal, classification of coal, proximate and ultimate analysis of coal,numericals based on analysis of coal - Dulong formula. types of carbonisation of coal-low temperature and high temperature carbonization. Liquid fuels : Origin of petroleum, composition of petroleum, refining of petroleum, octane number of petrol, cetane number of diesel, power alcohol, biodiesel. Gaseous fuels : Composition, properties and applications of natural gas, treatment products such as CNG, LPG, LNG. Combustion -Chemical reactions, calculation on air requirement for combustion – numerical</p>
<p>Unit – 3 CORROSION AND LUBRICANTS Corrosion and its prevention- Definition, atmospheric corrosion-mechanism, Wet corrosion-mechanism, electrochemical and galvanic series, Factors affecting corrosion-nature of metal, nature of environment, Pourbaixdiagram. Methods of prevention of corrosion-cathodic and anodic protection. Metallic coatings, electroplating, hot dipping, blacodizing, powder coating surface conversion coating. Lubricants- Classification of lubricants, mechanisms of lubrication and properties of lubricating oils.</p>

Recommended Books:

1. Materials science and engineering an introduction, William D. Callister, (Jr.Wiley. publisher)
2. Principles of the solid state, H.V. Keer, (New age international publishers).
3. Text book of engineering chemistry, R.N. Goyal and Harrmendra Goel, (Ane books India).
4. Text book of Physical chemistry, Samuel Glasstone (Mcmiillon and Co. Ltd.)

PART-II

Detailed Syllabus of Engineering Physics

Topics
<p>Unit – 4 WAVE PARTICLE DUALITY AND WAVE EQUATIONS</p> <p>Wave Particle Duality - Wave particle duality of radiation and matter, concept of group velocity and phase velocity; Uncertainty principle, Illustration of electron diffraction at a single slit.</p> <p>Wave Equations - Concept of wave function and probability interpretation, Physical significance of the wave function, Schrodinger's time independent and time dependent wave equations, Applications of Schrodinger's time independent wave equations to problems of (i) Particle in a rigid box (infinite potential well), Comparison of predictions of classical mechanics with quantum mechanics (ii) Particle in a non-rigid box (finite Potential Well)- Qualitative (results only).</p>
<p>Unit – 5 LASERS AND SUPERCONDUCTIVITY</p> <p>Lasers :- Requirement for lasing action (stimulated emission, population inversion, pumping), Characteristics– mono-chromaticity, coherence, directionality, brightness. Various levels of laser systems with examples (i) Two level laser system- semiconductor laser (ii) Three level laser system- Ruby laser and He-Ne laser. Applications (i) Communication systems - fibre optics in brief, (ii) Information technology holography- construction, reproduction.</p> <p>Superconductivity :- Introduction to superconductivity, Properties of superconductors (zero resistance, Meissner effect, critical fields, persistent currents), isotope effect, BCS theory. Type I and type II Superconductors, Applications (super conducting magnets, transmission lines etc), DC and AC Josephson effect.</p>
<p>Unit – 6 SEMICONDUCTOR PHYSICS AND PHYSICS OF NANOPARTICLES</p> <p>Semiconductor Physics - Band theory of solids, Classification of solids on the basis of band theory, Types of semiconductors, Introduction to the concept of electrical conductivity, conductivity of conductors and semiconductors. Hall effect and Hall coefficient, Fermi-Dirac probability distribution function, Position of Fermi level in intrinsic semiconductors (with derivation) and in extrinsic semiconductors (variation of Fermi level with temperature (without derivation)), Band structure of PN junction diode under zero bias, forward bias and reverse bias; Transistor working, PNP and NPN on the basis of band diagrams, Photovoltaic effect, working of a solar cell on the basis of band diagrams and Applications.</p> <p>Physics of Nanoparticles - Introduction, Nanoparticles, Properties of nanoparticles (optical, electrical, magnetic, structural, mechanical), Brief description of different methods of synthesis of nanoparticles such as physical, chemical, biological, and mechanical. Synthesis of colloids. Growth of nano particles, Synthesis of metal nanoparticles by colloidal route, Applications of nanotechnology-electronics, energy, automobiles, space and defence, medical, environmental, textile, cosmetics</p>

Reference Books:

1. Principles of Physics, Serway and Jewett (Saunders college publishing).
2. Introduction to Solid State Physics, Kittel C (Wiley and Sons).
3. Laser and Non-Linear Optics, B. B. Laud (Oscar publication)
4. Physics of the Atom, Wehr and Richards (Addison, Wesley).
5. Nanotechnology, Principles and Practices, Dr. S. K. Kulkarni (Capital Publishing Company).
6. A Textbook of Engineering Physics, Avadhanulu and Kshirsagar (S. Chand & Company).

Subject Code: 300203

Subject Name: Basic Mechanical Engineering

Lectures: 4 Hrs./Week

ESE duration: 3 Hrs.

Detailed Syllabus

Topics
<p>Unit – 1 Thermodynamics -System and control volume thermodynamic property. Zeroth law of thermodynamics. Work and Heat - Work and heat as path function, flow work, Non-flow process versus flow process, work done in frictionless Quasi-Equilibrium process, First law of thermodynamics: - 1st law of thermodynamics and its application to non-flow process and steady flow process.</p>
<p>Unit – 2 Properties of Steam - Types of Steam: Wet, Saturated and Superheated Steam, Phase transformation at constant pressure, sensible heat, latent heat, superheat, Internal energy. Enthalpy. Dryness fraction, steam processes - Constant volume, Adiabatic, Isothermal, Polytropic, and Entropy of Steam. Air Cycle -Otto, Diesel, Dual combustion cycle for I.C. engines. Reversed Carnot cycle for Refrigeration, Limitation of Reversed Carnot Cycle.</p>
<p>Unit – 3 Stress Strain curve for ductile and brittle materials, Types of stress and strain, Relation between elastic constants, Principle of superposition. Boiler - Introduction and classification of Boiler, Mountings and accessories, Draught, Types of draught</p>
<p>Unit – 4 Gas Welding - Types of Gas flame, Equipment used in high pressure and low pressure gas welding plant, Types of flux. Arc Welding: Arc welding equipment, flux coating on welding electrodes. Machine Tools: Working, classification and specification of lathe, drilling machine, shaper, specification of machine tools.</p>
<p>Unit - 5 Machine elements- Power transmission shafts, axles, keys, bearings Introduction of Power Transmission Devices- belt drives, chain drive, gears, couplings, clutch, brakes (types and applications). Mechanisms - Slider crank mechanism, four bar chain mechanism, List of various inversions of four bar chain mechanism</p>

Text Books:

1. Thermodynamics - R. Yadav (Vol. I & II)
2. Engineering thermodynamics - P.K. Nag
3. Thermodynamic Approach - D.S. Kumar
4. Workshop Practice- Vol-I, II - Hajra & Choudhary
5. Theory of Machine- S S Ratan

Subject Code: 300204

Subject Name: Engineering Drawing

Lectures: 4 Hrs./Week

ESE duration: 4 Hrs.

Detailed Syllabus

Topics
<p>Unit – 1 Introduction to Engineering Drawing- Use of drawing instruments, types of Lines, dimensioning systems as per I.S. conventions. Scales and Engineering Curves- Scales (plain & diagonal), Introduction to conic sections, basic construction of Cycloid, Involute and Helix.</p>
<p>Unit – 2 Projection of Points and Lines -Lines inclined to both the Reference planes. (Excluding Traces). Projection of Planes- Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to HP and VP (Exclude composite planes) .</p>
<p>Unit – 3 Projection of Solids - (Prism, Pyramid, Cylinder, Cone) Solid projection with the axis inclined to HP and VP. (Exclude Spheres, Composite and Hollow solids). Section of solids - Section of Prism, Pyramid, Cylinder, & Cone , cut by plane perpendicular to at least one reference plane.</p>
<p>Unit – 4 Development of Surfaces - Lateral surface development of Prism, Pyramid, Cylinder, Cone with section plane inclined to HP or VP only. Orthographic Projections - Different views of a simple machine part as per the first angle projection method recommended by I.S.</p>
<p>Unit - 5 Isometric Projections- Isometric projection/ drawing of blocks or machine parts or assembly problems of solids (excluding spheres).</p>

(NOTE – ONLY FIRST ANGLE METHOD OF PROJECTIONS SHOULD BE USED)

Text Books.

1. N.D. Bhatt, “Engineering Drawing (Plane and solid geometry)”, Charotar Publishing House Pvt. Ltd.
2. N.D. Bhatt & V.M. Panchal, “Machine Drawing”, Charotar Publishing House Pvt. Ltd.

References.

1. M.B Shah & B.C Rana, “Engineering Drawing”, Pearson Publications.
2. P.J. Shah, “Engineering Graphics”, S Chand Publications.
3. Dhananjay A Jolhe, “Engineering Drawing” Tata McGraw Hill
4. R.K. Dhawan, “Engineering Drawing” S. Chand.

Subject Code: 300205

Subject Name: Logic Building through Computer Programming

Lectures: 4 Hrs./Week

ESE duration: 3 Hrs.

Detailed Syllabus

Topics
<p>Unit – 1 Flowcharts Definitions, All Important Symbols and their implementations through Problems Algorithms Definitions, Implementations through Problems, Efficiency of Algorithms</p>
<p>Unit – 2 Program : Definition, Introduction Expressions in C Arithmetic and Boolean expressions, Use of standard functions, Assignment statements, Input and output Concept of Scalar data types in C , Scope and life time, type conversion</p>
<p>Unit – 3 Expressing Algorithms – Iteration Ordering a solution in a loop C- Control structures for Iteration Expressing Algorithms – Selection C-Control structures for selection</p>
<p>Unit – 4 Decomposition of solution Defining Functions in C Functions and parameters Introduction to recursive functions</p>
<p>Unit - 5 Additional C data types Arrays – single and multi dimensional Strings Structures Files Pointers</p>

Text Books:

1. Programming in C ; second edition; Pradeep Day and Manas Gosh ;Oxford University Press 2011
2. C Programming with Problem solving ; Jacqueline A. Jones & Keith Harrow – Dreamtech India–Scott Jones California USA

Reference

1. Introduction to Engineering programming – James Paul Hollowat – John Wiley
2. Introduction to programming and problem solving ; G. Michael Schneider ; Wiley India edition

Subject Code: 300206

Subject Name: Environmental Science

Lectures: 4 Hrs./Week

ESE duration: 3 Hrs.

Detailed Syllabus

Topics
<p>Unit – 1 ECOSYSTEM AND BIODIVERSITY Ecology-definition, scope and importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem. Introduction, types, characteristic features, structure and function of forest, grass land, desert and aquatic (fresh water, estuarine and marine) ecosystem. Biodiversity-Definition-genetic species and ecosystem diversity. Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity-habitat loss, poaching of wild life, human-wildlife conflicts. Endangered and endemic species. Conservation of biodiversity-in situ and ex-situ conservation of biodiversity.</p>
<p>Unit – 2 NATURAL RESOURCES AND SOCIAL ISSUES Natural Resources-Forest resources-use and overexploitation, deforestation, forest management. Water resources-sources, use and conflicts over water, dams-benefits and problems. Mineral resources-mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources-world food problems, environmental impact of modern agriculture-fertilizer and pesticides, overgrazing and land resources-land degradation- land slides, soil erosion and desertification. Energy resources- growing energy needs renewable and non-renewable energy resources and use of alternate-energy sources. Social Issues-Environmental impact assessment (EIA), sustainable development. Urban problems related to energy. Environmental protection act-air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection Act, Forest conservation Act. Role of an individual in prevention of pollution. Carbon Credit –Introduction, General concept, Types of carbon credit projects, Green Building</p>
<p>Unit – 3 ENVIRONMENTAL POLLUTION I Air Pollution-sources of air pollution. Sources, effects and control measures of oxides of nitrogen, oxides of sulphur, oxides of carbon, hydrocarbon, chlorofluro carbons and particulates. Green house effect-causes and effects on global climate and consequences. Ozone depletion-causes, mechanism and effect on the environment. Smog-sulfurous and photochemical smog-effect on the environment. Acid rain-theory of acid rain and effects. Indoor Air pollution. Noise Pollution -Sources, effects and control. Thermal Pollution- Sources, effects and control. Radioactive Pollution- Sources, effects and control.</p>
<p>Unit – 4 ENVIRONMENTAL POLLUTION II Water Pollution- characteristics, types, sources, classification , prevention and control of water pollution. water quality standards, principles of water and wastewater treatment. Soil Pollution -Sources, effects and control. Marine Pollution- Sources, effects and control.</p>
<p>Unit - 5 ENVIRONMENTALMANAGEMENT Solid Waste Management - Solid waste management – causes, effect and control measures of urban and industrial wastes Water and Waste Water Management- Water and rain water conservation, rain water harvesting, flood water management, water quality management, fresh water management, waste water management and ground water management, cloud seeding, watershed management and its importance.</p>



Recommended Books:

1. Raghavan Nambiar K., "Text Book of Environmental Studies" 2 nd edition, Scitech Publications, India, Pvt. Ltd, Chennai, 2008
2. A.K. De, "Environmental chemistry" 6 rd edn; New age international (P) Ltd, New Delhi, 2006.
3. Sharma B.K., "Environmental chemistry" goel publishing house, Meerut, 2001.
4. Sodhi G. S., Fundamental concepts of environmental chemistry, Narosa publishing house, New Delhi.
5. Dara S .S., " A text book of environmental chemistry and pollution control, S. Chand & Company Ltd, New Delhi, 2002.
6. Richard T. Wright, environmental science, 9 th edition, Pearson education inc, New Delhi,2007.
7. Meenakshi P., "Elements of environmental science and engineering" Prentice-hall of India, New Delhi, 2006.
8. J.G. Henry and G.W. Heinke, Environmental Science and Engineering, Pearson Education, 2004
9. G.B. Masters, Introduction to Environmental Engineering and Science, Pearson Education, 2004.

Subject Code: 300207

Subject Name: Basic Workshop Practice - II

Practical: 4 Hrs. /Week

Detailed Syllabus

Topics
Fitting Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling, tapping. Term work to include one job involving following operations : filing to size, one simple male- female joint, drilling and tapping
Machine Shop At least one turning job is to be demonstrated.
Sheet metal working and Brazing Use of sheet metal, working hand tools, cutting , bending , welding

Term work: Term work shall consist of respective reports and jobs of the trades selected. The final certification and acceptance of term – work ensures the satisfactory performance of laboratory Work.

Subject Code: 300208

Subject Name: Applied Sciences – II Lab.

Practical: 4 Hrs. /Week

The contents are distributed into two parts : Engineering Chemistry Lab. and Engineering Physics Lab.

PART-I

Detailed Syllabus of Engineering Chemistry Lab.

Topics

Term work : Atleast Ten experiments must be completed. Some of the listed experiments are given below:-

1. Determination of sodium hydroxide and sodium carbonate in given water sample.
2. Determination of sodium bicarbonate and sodium carbonate in given water sample.
3. Determination of temporary and permanent hardness of water sample by EDTA method.
4. Determination of calcium and magnesium hardness of water sample by EDTA method.
5. To determine chloride content of water sample by Mohr's method.
6. To determine the ion exchange capacity of a given anion exchange resin
7. To determine the ion exchange capacity of a given cation exchange resin
8. Spectrophotometric / colorimetric estimation of Fe^{++} from the given solution.
9. To determine moisture, volatile matter and ash content of a given sample of coal.
10. Study of corrosion of metals in medium of different pH.
11. To determine the heat capacity of a calorimeter.
12. Determination of Flash Point and Fire Point of lubricant by Pensky Martin apparatus
13. Determination of acid value of an lubricating oil.

And also more experiments can be selected based on the contents of Engineering Chemistry of the subject code 300202 (Applied Sciences – II (Engineering Chemistry))

Term work is based on performance and regular checking of the experiments.

Laboratory Manual

1. Laboratory manual on Engineering Chemistry, Sudharani (Dhanpat Rai publishing company)
2. Applied Chemistry theory and practical O.P. Virmani and A.K. Narular (New Age International publishers).
3. A textbook on experimental and calculations in engineering chemistry, S.S. Dara(S.Chand& CompanyLTD)

PART-II

Detailed Syllabus of Engineering Physics Laboratory

Topics
<p>Term work : Atleast Ten experiments must be completed. Some of the listed experiments are given below:-</p> <ol style="list-style-type: none">1. Determination of energy band gap of a semiconductor.2. Characteristics of a solar cell, calculation of fill factor, To plot power vs. resistance graph and hence to calculate value of R for maximum value of workable power.3. Hall effect and determination of Hall coefficient.4. Characteristics of photocell/photo diode.5. Diode characteristics (Ge/Si, LED, Zener)6. Synthesis of metal Nano Particles (gold/silver) by the chemical route.7. Measurement of diameter of a thin wire using a laser.8. To find refractive index of glass using a laser (using Snell's law).9. An experiment based on laser (e.g., To find number of lines /cm of a given grating using a laser source/ to find beam divergence/true beam width)10. Characteristics of NPN/PNP Transistors CB and CE mode. <p>And also more experiments can be selected based on the contents of Engineering Physics of the subject code 300202 (Applied Sciences – II (Engineering Physics))</p> <p>Term work is based on performance and regular checking of the experiments.</p>

Laboratory Manual

1. Textbook of Engineering Physics Practical- Dr. Ruby Das, C. S. Robinson, Rajesh Kumar and Prashant Kumar Sahu, University Science Press(New Delhi).
2. Experiments in Engineering Physics- M. N. Avadhanulu, A. A. Dani and P. M. Pokley, S. Chand and Company Limited(New Delhi)

Subject Code: 300209

Subject Name: Basic Mechanical Engineering Lab.

Practical: 2 Hrs. /Week

Detailed Syllabus

Topics

Term work : Term work shall consist of record of at least Ten experiments out of the following;

1. Assembly and working of 4-bar mechanisms
2. Demonstration of operations of center lathe (turning, step turning, facing, boring, taper turning,).
3. Demonstration of operations of center lathe (knurling, grooving, threading)
4. Demonstration of operations on drilling machines (drilling, reaming, spot facing, counter boring)
5. Demonstration of operations on shaper machine.
6. Demonstration of Two stroke IC engine
7. Demonstration of four stroke IC engine
8. Study of Package type boiler
9. Study of power transmitting elements: Coupling
10. Study of power transmitting elements: Gears. Bearings
11. Experimental verification of effect of insulating material on heat transfer
12. To perform the Tensile Test of Mild Steel on U.T.M and To Draw Stress–Strain Curve.

Any other experiments with reference to the contents of subject code 300203.

Subject Code: 300210

Subject Name: Engineering Drawing Lab.

Practical: 2 Hrs. /Week

Practical: 2 Hrs. /Week

Detailed Syllabus

Topics
<p>Term work : At Least 10 sheets (minimum 4 problems) to be prepared.</p> <p>Title of sheet</p> <ol style="list-style-type: none">1. Basics of drawing2. Geometric constructions3. Engineering curves – I4. Engineering curves - II5. Projection of points and straight lines6. Projection of planes7. Projection of solids8. Section of solids9. Development of surfaces10. Orthographic projection (without section)11. Isometric projection – Assembly type of problems.12. Isometric projection – from machine parts or different views

Subject Code: 300211 Subject Name: Logic Building through Computer Prog. Lab.
Practical: 2 Hrs. /Week

Detailed Syllabus

Topics
<p>Laboratory Assignments</p> <p>A). Students are expected to solve and execute at least 20 programming problems based on above syllabus. Some of the important problems are :-</p> <ol style="list-style-type: none"> 1. Study of text editor with all important commands 2. Study of different directive statements of C language 3. Study of user-defined and system-defined identifiers 4. Writing program using statements like “printf” and “scanf” 5. Writing program using only conditional if – else statement 6. Writing program to check for the following : <ol style="list-style-type: none"> a) Whether a number is a prime number or Not b) Whether a year is a leap or Not c) Whether a number is ODD or EVEN d) Whether a number is POSITIVE or NEGATIVE 7. Writing program using loop statements like while, for, switch and so on. 8. Writing menu driven program for selection with choice and displaying 9. Writing program to display Fibonacci series upto N terms 10. Writing program to display sum of Fibonacci series upto N terms 11. Writing program to exchange / swap any two values 12. Writing program to display sum of series of odd and even numbers 13. Writing program for solving roots of a quadratic equation 14. Writing program for solving matrix entry and its display 15. Writing program for matrix addition of order 2 by 2 and 3 by 3 16. Writing program for matrix addition of order N by N 17. Writing program for matrix multiplication of order 2 by 2 18. Writing program for sum and difference of matrices of order 2 by 2 and 3 by 3 19. Writing program for finding factorial of any number 20. Writing program for finding permutations and combinations 21. Writing program for the implementation of an array 22. Writing program for displaying an array in ascending and descending order 23. Writing program for function and procedure calls 24. Writing program for finding mean, mode, median, std. deviation, variance and other statistical measures by entering some sequence of data <p>More problems can be incorporated as per the syllabus of subject code 300205.</p> <p>B). Practical Record book of the above term - work should comprise of writing the problem definition either as Algorithm or flow-chart and source code in C (preferably hand written) for all the 20 problems and the results obtained (preferably computer print- out after executing the C code).</p>

Subject Code: 300212

Subject Name: Environmental Science Lab.

Practical: 2 Hrs. /Week

Detailed Syllabus

Term work: Term work shall consist of record of at least Ten experiments, based on the following:

1. Sampling of water and waste water
2. To determine the free CO₂ in a given sample of water.
3. To determine the Dissolved Oxygen (DO) in a given water sample.
4. To determine the Biological Oxygen Demand (BOD) of given waste water sample.
5. To determine the Chemical Oxygen Demand (COD) of given waste water sample.
6. To determine the acidity of in a given water sample.
7. Determination of inorganic pollutants in water sample.
8. Determination of total residual chloride in water sample.
9. Determination of particulates water soluble ions.
10. Determination of pH of given water sample by pH meter.
11. Determination of mass concentration of SPM in ambient air
12. Determination of mass concentration of PM₁₀ and PM_{2.5} in ambient air.
13. Determination of SO_x and NO_x mass concentration in ambient air.
14. Determination of moisture, pH and total nitrogen in soil sample.
15. Determination of heavy metals in sludge and sediments.
16. Estimation of green house gas (CO₂) using a green house gas calculator
17. Determination of polycyclic hydrocarbon in environmental samples.
18. Case study

And also more experiments can be selected based on the contents of Environmental Science of the subject code 300206

Laboratory Manual:

1. Laboratory manual on Engineering Chemistry, Sudharani (Dhanpat Rai publishing company)
2. Applied Chemistry theory and practical O.P. Virmani and A.K. Narular (New Age International publishers).