



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

BE Ist SEMESTER

BE 11 PHYSICS

TOTAL -60 HOURS

OBJECTIVE:

- The students are to learn the below mention
- Wave nature of particle
- Wave optics
- Solids
- Laser
- Electrostatics in vacuum

COURSE CONTENTS:

Module 1:

Wave nature of particles and the Schrodinger equation

Introduction to Quantum mechanics, Wave nature of Particles, operators, Time-dependent and time- independent Schrodinger equation for wave function, Application: Particle in a One Dimensional Box, born interpretation, Free-particle wave function and wave-packets, v_g and v_p relation Uncertainty principle. (12 hours)

Module 2:

Wave optics

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach- Zehnder interferometer. Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power. (12 hours)

Module 3:

Introduction to solids

Free electron theory of metals, Fermi level of Intrinsic and extrinsic, density of states, Bloch's theorem for particles in a periodic potential, Kronig-Penney model (no derivation) and origin of energy bands. V-I characteristics of PN junction, Zener diode, Solar Cell, Hall Effect. (12 hours)



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Module 4:

Lasers

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO₂), solid-state lasers(ruby, Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine. Introduction to Optical fiber, acceptance angle and cone, Numerical aperture, V number, attenuation. (12 hours)

Module 5:

Electrostatics in vacuum

Calculation of electric field and electrostatic potential for a charge distribution; Electric displacement, Basic Introduction to Dielectrics, Gradient, Divergence and curl, Stokes' theorem, Gauss Theorem, Continuity equation for current densities; Maxwell's equation in vacuum and non-conducting medium; Poynting vector. (12 hours)

OUTCOME

Exposure to below mentioned

1. Schrodinger equation
2. Newton's ring
3. Solar cell
4. Introduction to optical fiber
5. Maxwell's equation

List of Experiment

1. To determine the dispersive power of prism.
2. To determine the λ of sodium light with the help of newton's Ring.
3. Resolving Power of Telescope.
4. YDSE (Young's double slit Experiment).
5. To determine the frequency of AC mains supply.
6. V-I Characteristics of P-N junction diode.
7. To determine the λ of diode losses by single slit diffraction.
8. To determine the plank's constant with the help of photocell.
9. Hall's effect experiment.
10. Calibration of ammeter by using reference zener diode.



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11. To study the effect of temperature on reverse saturation current in P-N junction diode and to determine the energy band gap.
12. To determine the λ of sodium by using plane diffraction grating.
13. To determine the prominent lines of mercury source by plane diffraction grating.
14. To determine the numerical aperture of an optical fiber.
15. To determine λ of given laser by plane diffraction grating.

Suggested Reference Books

1. A. Ghatak, Optics.
2. O. Svelto, Principles of Lasers.
3. David Griffiths, Introduction to Electrodynamics.
4. D.J. Griffiths, Quantum Mechanics.
5. Halliday & Resnick, Physics.



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BE Ist SEMESTER

BE 12 MATHEMATICS-I

TOTAL -60 HOURS

OBJECTIVE:

- The objective of their course is to familiarize the prospective engineers with techniques in calculus, multivariate analyzer and linear algebra. it aim to equip the students with standard concepts and tools at an intermediate to advance level that will serve them well towards taking more advanced level of mathematics and applications that they would find useful in their disciplines.

Module 1: Calculus:

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. (12 HOURS)

Module 2: Calculus:

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima. (12 HOURS)

Module 3: Sequences and series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem. (12 HOURS)

Module 4: Multivariable Calculus (Differentiation):

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence. (12 HOURS)

Module 5: Matrices

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skewsymmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

(12 HOURS)

OUTCOME:

The student will learn

- To apply differential and integral calculus to notions of curvature and to improper integrals, apart from some other applications they will have a basic understanding of beta and gamma functions.
- The fallout of Rolle's Theorem that is fundamental to application of analysis to engineering problems.
- The tool of power series and Fourier series for learning advanced Engineering Mathematics.



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- To deal with functions of several variables those are essential in most branches of engineering.
- The essential tool of matrices and linear algebra in comprehensive manner.

BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.



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BE Ist SEMESTER

BE 13 BASIC ELECTRICAL & ELECTRONICS ENGINEERING

TOTAL -60 HOURS

OBJECTIVE

- To understand and analysis basic electrical and magnetic circuits
- To study the working principle of electrical machine and power converters
- To introduce the components of low voltage electrical installations.

MODULE I

Electrical circuit analysis- Voltage and current sources, dependent and independent sources, source conversion, DC circuits analysis using mesh & nodal method, Thevenin's & superposition theorem, star-delta transformation. phase AC circuits under sinusoidal steady state, active, reactive and apparent power, physical meaning of reactive power, power factor, 3-phase balanced and unbalanced supply, star and delta connections. **(12 HOURS)**

Module II

Transformers- Review of laws of electromagnetism, mmf, flux, and their relation, analysis of magnetic circuits. Single-phase transformer, basic concepts and construction features, voltage, current and impedance transformation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, OC and SC test. **(12 HOURS)**

Module III

Rotating Electric machines- Constructional details of DC machine, induction machine and synchronous machine, Working principle of 3-Phase induction motor, Emf equation of 3-Phase induction motor, Concept of slip in 3-Phase induction motor, Explanation of Torque-slip characteristics of 3-Phase induction motor, Classification of self excited DC motor and generator.

(12 HOURS)

Module IV

Digital Electronics-Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, floating point and signed numbers, Demorgan's theorem, AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates and their representation, truth table, half and full adder circuits, R-S flip flop, J-K flip flop. **(12 HOURS)**

Module V

ELECTRONIC COMPONENTS AND CIRCUITS- Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations, different configurations and modes of operation of BJT, DC biasing of BJT.

(12 HOURS)



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OUT COME:

- Get an exposure to common electrical component and their ratings
- Make electrical connections by wire of appropriate ratings.
- Understand the usages of common electrical measuring instruments.
- Understand the basic characteristics of transformer and electrical machines.
- Get an exposure to the working of power electronic converters.

BOOKS:

1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
2. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition.
3. Millman, Halkias & Parikh, Integrated Electronics, Mc Graw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. J.S. Katre, Basic Electronics Engg, Max Pub. Pune.
6. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition



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BE Ist SEMESTER

BE 14 ENGINEERING GRAPHICS

TOTAL -60 HOURS

OBJECTIVE:

- All phase of manufacturing or construction requires the conversion of new ideas and design concept into the basic line language of graphics.

Module I

Scales: Representative factor, plain scales, diagonal scales, scale of chords.

Conic sections: Construction of ellipse, parabola, hyperbola by different methods; Normal and Tangent.

Special Curves: Cycloid, Epi-cycloid, Hypo-cycloid, Involutives, Archimedean and logarithmic spirals.

(10 HOURS)

Module II

Projection: Types of projection, orthographic projection, first and third angle projection, **Projection of points and lines**, Line inclined to one plane, inclined with both the plane, True Length and True Inclination, Traces of straight lines. (10 HOURS)

Module III

Projection of planes and solids: Projection of Planes like circle and polygons in different positions; Projection of polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions. (10 HOURS)

Module IV

Section of Solids: Section of right solids by normal and inclined planes; Intersection of cylinders.

Development of Surfaces: Parallel line and radial - line method for right solids. (10 HOURS)

Module V

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection from orthographic drawing. (10 HOURS)

Module VI

Computer Aided Drafting (CAD): Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD. (10 HOURS)



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OUTCOME:

The student becomes aware of below:

- Introduction to Engineering drawing covering
- Orthographic projections
- Section of solids
- Isometric projection
- Computer aided drafting

BOOKS:

1. Visvesvaraya Tech. University; A Premier on Computer Aided Engg drawing; VTU Belgaum
2. Bhatt N.D.; Engineering Drawing, Charotar
3. Venugopal K.; Engineering Graphics; New Age
4. John KC; Engg. Graphics for Degree; PHI.
5. Gill P.S.; Engineering Drawing; kataria
6. Jeyopoovan T.; Engineering drawing & Graphics Using AutoCAD; Vikas
7. Agrawal and Agrawal; Engineering Drawing; TMH
8. Shah MB and Rana BC; Engg.drawing; Pearson Education
9. Luzadder WJ and Duff JM; Fundamental of Engg Drawing; PHI
10. Jolhe DA; Engg. Drawing an Introduction; TMH
11. 11 Narayana K.L.; Engineering Drawing; Scitech



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

BE Ist SEMESTER

BE 15 BASIC CIVIL ENGINEERING & ENGINEERING MECHANICS

TOTAL -60 HOURS

OBJECTIVE:

- Resolve the forces.
- Find the resultant of given force system
- Find the reaction of beam
- Find the centre of gravity of composite solid.
- Find M.A.,V.R., Efficiency and establish law of machine

Module I Building Materials & Construction

Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar
Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, stair cases types and their suitability. (12 HOURS)

Module II Surveying & Positioning:

Introduction to surveying Instruments – levels, theodolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling. (12 HOURS)

Module –III Mapping & Sensing:

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications. (12 HOURS)

Module IV Forces and Equilibrium:

Graphical and Analytical Treatment of Concurrent and non- concurrent Co- planner forces, free Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems.

(12 HOURS)

Module – V Centre of Gravity and moment of Inertia:

Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple. (12 HOURS)



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OUTCOME:

The students understand the below mention:

- Verification of law of triangle law of forces and Lami's theorem.
- Verification of law of parallelogram law of forces.
- Determination of moment of inertia of flywheel.
- Determination of coefficient of friction between two given materials.
- Determination of forces in the member of jib crane

BOOKS:

1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication.
3. Punmia, B.C., Surveying, Standard book depot.
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI
5. S.P, Timoshenko, Mechanics of structure, East West press Pvt.Ltd.
6. Surveying by Duggal – Tata McGraw Hill New Delhi.
7. Building Construction by S.C. Rangwala- Charotar publications House, Anand.
8. Building Construction by Grucharan Singh- Standard Book House, New Delhi
9. Global Positioning System Principles and application- Gopi, TMH
10. R.C. Hibbler – Engineering Mechanics: Statics & Dynamics.
11. A. Boresi & Schmidt- Engineering Mechines- statics dynamics, Thomson' Books
12. R.K. Rajput, Engineering Mechanics S.Chand & Co.



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

BE Ist SEMESTER BE 16 INTRODUCTIONS TO YOGA

TOTAL -60 HOURS

OBJECTIVE:

The students to be made aware of yoga, concept of kriya yoga, bandha and mudras, yoga vashitha, nadi and kanda.

MODULE-1

- Meaning of yoga, Definition, Aim and Objective of yoga.
- Concept of ideal Hut and ideal place and its relevance in modern times.
- Do's and Don't for a yoga practitioner.
- Goal of Hatha yoga and relevance of hatha yoga in contemporary times. (12 HOURS)

MODULE -2

- Concept of kriya yoga.
- Concept of Asanas (Definition, various classification, number of Asanas).
- Concept of pranayama (Definition and types).
- Concept of shhat karma (Dhoti, Neti, Vasti, Kapalbhathi, Tratak, Noli, and Agnisaar). (12 HOURS)

MODULE -3

- Concept, definition of bandha and mudras.
- Concept, definition, benefits and techniques of pratyahar (Patanjalean and Hathयोगic).
- Concept of Dharna and dhyana (Patanjali and non Patanjali Concept). (12 HOURS)

MODULE -4

- Highlights of yoga vashitha.
- Yamas, Niyamas, Asanas, Pranayam, Pratyahar, Dharna And Samadhi According to vashitha sanhita.
- Concept of vayu-prana 5 principal pranas function, location, 5 Uppranas sub ordinate function, location.
- Concept of Nadi and Kanda their location and range, its importance in yoga. (12 HOURS)

MODULE -5

- Raja yoga.
- Gyan Yoga.
- Karma Yoga.
- Bhakti Yoga.
- Mantra Yoga.
- Importance of Haths yoga in daily life and social life. (12 HOURS)



PRACTICAL

ASANA

1. Halasana
2. Pashichmoutanasana
3. Ardha Matsyendra Asana
4. Akrnadhanurasana
5. Uttan Kurmasana
6. Trikorasana
7. Matsyendrasana
8. Kukkutasana
9. Naukasana
10. Garulasana
11. karnaperasana
12. Padangusthaasana
13. Vatayanasana
14. Guptasana
15. Ugrasana
16. Vipreetkarni
17. Tadaasana
18. Sarwanganasana
19. Varkshasana

PRANAYAMA

1. Anulom – vilom
2. Sitkari
3. Ujjayi
4. Shitali
5. Bhastrika

MUDRA

1. Yoga Mudra
2. Brahm Mudra

BHANDHA

1. Jalandhar Bhandha
2. Udiyan Bhandha

MEDITATION

1. 10-15 minutes

OUTCOME:

The students having learned types of asana, pranayama ,mudra, bhandha and Meditation.



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BE II nd SEMESTER

BE 21 CHEMISTRY-I

TOTAL -60 HOURS

OBJECTIVE:

The concept developed in their course will aid in qualification of several concepts in chemistry that have been introduced at 10+0 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomenon at nanometer levels, one has to be base the description of all chemical processes at molecular levels.

COURSE CONTENTS:

MODULE-I

Water – Analysis, Treatments and Industrial Applications

Sources, Impurities, Hardness & its units, Determination of hardness by EDTA method, Alkalinity & It's determination and related numerical problems. (8 HOURS)

MODULE-II

Boiler problem & softening methods

Boiler troubles (Sludge & Scale, Priming & Foaming, Boiler Corrosion, Caustic Embrittlement), Softening methods (Lime-Soda, Zeolite and Ion Exchange Methods) and related numerical problems. (8 HOURS)

MODULE-III

Lubricants and Lubrication

Introduction, Mechanism of lubrication, Classification of lubricants, significance & determination of Viscosity and Viscosity Index, Flash & Fire Points, Cloud & Pour Points, Aniline Point, Acid Number, Saponification Number, Steam Emulsification Number and related numerical problems. (8 HOURS)

MODULE-IV

Polymer & polymerization

Introduction, types of polymerization, Classification, mechanism of polymerization (Free radical & Ionic polymerization). Thermoplastic & Thermosetting polymers Elementary idea of Biodegradable polymers, preparation, properties & uses of the following polymers- PVC, PMMA, Teflon, Nylon 6, Nylon 6:6, Polyester phenol formaldehyde, Urea- Formaldehyde, Buna N, Buna S, Vulcanization of Rubber. (9 HOURS)



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MODULE-V

Phase equilibrium and Corrosion

Phase diagram of single component system (Water) Phase diagram of binary Eutectic System (Cu-Ag.) Corrosion: Types, Mechanisms & prevention. .(9 HOURS)

MODULE-VI

Spectroscopic techniques and application

Principle, Instrumentation & Applications, electronics spectroscopy, Vibrational & Rotational Spectroscopy of diatomic molecules. .(9 HOURS)

MODULE-VII

Periodic properties

Effective Nuclear Charge, Variations: S, P, d & f Orbital energies of atoms in periodic table, Electronics Configuration, atomic & Ionic sizes, electron affinity & electro negativity, Ploarizability & Oxidation States. .(9 HOURS)

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular



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energy levels in various spectroscopic techniques

- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

Practical List

NOTE: At least 8 of the following core experiments must be performed during the session.

1. Water testing

- Determination of Total hardness by Complexometric titration method.
- Determination of mixed alkalinity
 - OH & CO₃**
 - CO₃ & HCO₃**
- Chloride ion estimation by Argentometric method.

2. Fuels & Lubricant testing:

- Flash & fire points determination by
 - Pensky Martin Apparatus,
 - Abel's Apparatus
 - Cleveland's open cup Apparatus
 - Calorific value by bomb calorimeter.
- Viscosity and Viscosity index determination by
 - Redwood viscometer No.1
 - Redwood viscometer No.2
- Proximate analysis of coal
 - Moisture content
 - Ash content
 - Volatile matter content
 - Carbon residue
- Steam emulsification No & Anline point determination
- Cloud and Pour point determination of lubricating oil

3. Alloy Analysis

- Determination of percentage of Fe in an iron alloy by redox titration using N-Phenyl anthranilic acid as internal indicator.
- Determination of Cu and or Cr in alloy by Iodometric Titration.
- Determination of % purity of Ferrous Ammonium Sulphate & Copper Sulphate.

Reference Books :

- 1 Chemistry in Engineering and Technology - Vol.1 &2 Kuriacose and Rajaram , McGraw Hill Education
- 2 Fundamental of Molecular Spectroscopy C.N. Banwell , McGraw Hill Education
- 3 Engineering Chemistry – B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
- 4 Basics of Engineering Chemistry – S.S. Dara & A.K. Singh, S. Chand &Company Ltd., Delhi.
- 5 Applied Chemistry – Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi.
- 6 Elementary Spectroscopy ,Y .R. Sharma , S. Chand Publishing
- 7 Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, New Age International Pvt. Ltd
- 8 Advanced Inorganic Chemistry, G.R. Chatwal, Goal Publishing house
- 9 Engineering Chemistry (NPTEL Web-book) B.L. Tembe, Kamaluddin and M.S. Krishna



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BE II nd SEMESTER 22 MATHEMATICS-II

TOTAL -60 HOURS

OBJECTIVE:

The objective of this course is to familiarize the prospective engineers with techniques in Ordinary and partial differential equations, complex variables and vector calculus. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

- To introduce effective mathematical tools for the solutions of ordinary and partial differential equations that model physical processes.
- To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.
- To acquaint the student with mathematical tools available in vector calculus needed various field of science and engineering.

COURSE CONTENTS:

Module 1:

Ordinary Differential Equations I :(12 hours) : Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

Module 2:

Ordinary differential Equations II:(12 hours) :Second order linear differential equations with variable coefficients, Method of variation of parameters, Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module 3:

Partial Differential Equations : (12 hours) : Formulation of Partial Differential equations, Linear and Non-Linear Partial Differential Equations, Homogeneous Linear Partial Differential Equations with Constants Coefficients.

Module 4:

Functions of Complex Variable :(12 hours) : Functions of Complex Variables: Analytic Functions, Harmonic Conjugate, Cauchy-Riemann Equations (without proof), Line Integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for Evaluation of Real Integral (Unit Circle).

Module 5: Vector Calculus : (12 hours) : Differentiation of Vectors, Scalar and vector point



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function, Gradient, Geometrical meaning of gradient, Directional Derivative, Divergence and Curl, Line Integral, Surface Integral and Volume Integral, Gauss Divergence, Stokes and Green theorems.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

OUTCOME:

The student will learn

- The mathematical tools needed in evaluating multiple integrals and their usages.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are use various techniques dealing engineering problem.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.



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BE II nd SEMESTER BE 23 PROGRAMMING FOR PROBLEM SOLVING WITH C++

TOTAL -60 HOURS

OBJECTIVE :

- To formulate simple algorithms for erythematic and logical problem
- To translate the algorithms to programs (in c++ language)
- To test and execute the programs and correct syntax and logical error.
- To implement conditional branching, iteration recursion.
- To decompose a problem into functions and synthesize a complete program using divide and Conquer approach.
- To use arrays, pointer and structures to formulate algorithms and program.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problem.

Module –I

Introduction To 'C' Language

Character set. variables and identifiers, built-in data types. variable definition, arithmetic operators and expressions, constants and literals, simple assignment statement, basic input/output statement, simple 'c' programs. (09 HOURS)

Module –II

Conditional Statements And Loops

Decision making within a program, conditions, relational operators, logical connectives, if statement, if-else statement, loops: while loop, do while, for loop. nested loops, infinite loops, switch statement, structured programming. (09 HOURS)

Module –III Arrays

One dimensional arrays: array manipulation; searching, insertion, deletion of an element from an array; finding the largest/smallest element in an array; two dimensional arrays, addition/multiplication of two matrices, transpose of a square matrix; null terminated strings as array of characters, representation sparse matrices. (09 HOURS)

Module –IV

Functions

Top-down approach of problem solving, modular programming and functions, standard library of c



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functions, prototype of a function: foollal parameter list, return type, function call, block structure, passing arguments to a function: call by reference, call by value, recursive functions, arrays as function arguments. **(09 HOURS)**

Module –V

Structures and Unions

Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions. **(08 HOURS)**

Module –VI

Pointers

Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays. **(08 HOURS)**

Module –VII File Processing

Concept of files, file opening in various modes and closing of a file, reading from a file, writing onto a file. **(08 HOURS)**

OUTCOME:

- To formulate the algorithms for simple problems.
- To translate given algorithms to a working and correct program.
- To be able to correct syntax errors or reported by the compiler.
- To be able to identify and correct logical error encountered at run time.
- To be able to write interactive as well as recursive programs.

Reference

1. Let Us C-Yaswant kanetkar,BPB
2. Programming in ANSI C-E. Balagurusamy, TMH



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

BE II nd SEMESTER BE 24 ENGLISH

TOTAL -60 HOURS

OBJECTIVE:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skill.

Module I - Languages and skills of communication

Linguistic techniques, Modern usages, Reading comprehension, English phonetic symbols/sings, Oral presentation, Audition Communication, Processes of Communication, Verbal and Non Verbal Communication, Barriers to Communication. (12 HOURS)

Module II - Application of linguistic ability

Writing of definitions of Engineering terms, Objects, Processes and Principles (Listening) Topics of General Interest, Reproduction from business, daily life, travel, health, buying and selling, company structure, systems etc. (12 HOURS)

Module III - Letter Writing:

Applications, Enquiry, Calling quotations, Tenders, Order and Complaint. (12 HOURS)

Module IV

Precise Writing, Noting and drafting, Technical Description of simple engineering objects and processes (writing), Report writing, precise writing, Note writing, Slogan writing comment, Speech advertising. (12 HOURS)

Module V

Writing Technical reports of the type of observation report, Survey report, Report of trouble, Laboratory Report and Project Report on the subjects of engineering. (Speaking) Vocabulary, Presentations, Demonstrations, Conversation– Telephone media, socializing, cultural events, debates, speech. (12 HOURS)

OUTCOME:

The student understands the below mention:

- Language and skills of communication
- Application linguistic ability
- Letter writing precise writing
- Writing technical reports



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- To be able to represent data in arrays, strings and structure and manipulate them through a program.
- To be able to declare pointers of different types and use them in defining self-referential structures.
- To be able to create, read and write to and from simple text files.

Topics to be covered in the Language laboratory sessions

1. Basic Grammar & Vocabulary (Synonyms /Antonyms, Analogies, sentence completion, correctly spelt words, idioms, proverbs, common errors).
2. Phonetic symbols and pronunciation.
3. Listening skills (Including Listening Comprehension)
4. Reading Skills (Including Reading Comprehension)
5. Writing Skills (Including structuring resume and cover letter)
6. Speaking Skills
7. Body Language
8. Oral Presentation: Preparation and delivery using audio – visual aids with stress n body language
And voice modulation (Topic to be selected by the teacher.) Final Assessment Should be based on Assignment, presentation and interview.

BOOKS:

1. Business Correspondence and Report Writing - By Sharma; TMH.
2. Living English Structure – By W.S. Allen; Longmans.
3. English Grammar – Ehrlich, Schaum Series; TMH.
4. Spoken English for India – By R.K. Bansal and IB Harrison Orient Longman.
5. New International Business English – by Joans and Alexander; OUP.
6. Effective Technical Communication – Rizvi; TMH.



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

BE II nd SEMESTER BE 25 ENVIROMENTAL STUDIES

TOTAL -60 HOURS

Module –I Energy-

Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources. (12 HOURS)

Module –II Ecosystem –

Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation, (12 HOURS)

Module –III Air Pollution & Sound Pollution

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial. (12 HOURS)

Module –IV Water Pollution–

Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent.

Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

(12 HOURS)

Module –V Society, Ethics & Human values

Impact of waste on society. Solid waste management (Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya. (12 HOURS)

BOOKS:

1. Harris, CE, Prichard MS, Rabin’s MJ, “Engineering Ethics”; Cengage Pub.
2. RanaSVS;“EssentialsofEcologyand Environment”; PHIPub.
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.



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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 Delhi
12. Joseph, B. Environmental Studies, 2009 Tata Mcgraw Hill, Edu India Ltd. New Delhi.
13. Gour R.R, Sangal, R & Bagaria, G.P. , Excel Books, A-45, Naraina Phase-I
 ,New Delhi.-110028



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BE II nd SEMESTER BE 26 WORK SHOP/ MANUFACTURING PRACTICE

TOTAL -60 HOURS

OBJECTIVE:

- The student will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Module I

Introduction: Manufacturing Processes and its Classification, Casting, Machining, Plastic deformation and metal forming, Joining Processes, Heat treatment process, Assembly process. Powder Metallurgy, introduction to computers in manufacturing. Black Smithy Shop Use of various smithy tools. Forging operations: Upsetting, Drawing down, Fullering, Swaging, Cutting down, Forge welding, Punching and drafting. Suggested Jobs : Forging of chisel., forging of Screw Driver.

(12 HOURS)

Module II

Carpentry Shop: Timber : Type, Qualities of timber disease, Timber grains, Structure of timber, Timber, Timber seasoning, Timber preservation .Wood Working tools: Wood working machinery, joints & joinery. Various operations of planning using various carpentry planes sawing & marking of various carpentry joints. Suggested Jobs :Name Plate ,Any of the Carpentry joint like mortise or tennon joint. (12 HOURS)

Module III

Fitting Shop: Study and use of Measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, micro meter. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting operations: Chipping filling, Drilling and tapping.Suggested Jobs :Preparation of job piece by making use of filling, sawing and chipping , drilling and tapping operations. (12 HOURS)

Module IV

Foundry: Pattern Making: Study of Pattern materials, pattern allowances and types of patterns. Core box and core print, .Use and care of tools used for making wooden patterns.

Moulding: Properties of good mould & Core sand, Composition of Green , Dry and Loam sand. Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split patterns. (12 HOURS)

Module V

Welding: Study and use of tools used for Brazing, Soldering, Gas & Arc elding. Preparing Lap &



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Butt joints using gas and arc welding methods, Study of TIG & MIG welding processes. Safety precautions.(12HOURS)

OUTCOME:

- Upon completion of the course, students will be able to fabricate components with their own hands.

BOOKS:

1. Bawa HS; Workshop Practice, TMH
2. Rao PN; Manufacturing Technology- Vol.1& 2, TMH
3. John KC; Mechanical workshop practice; PHI
4. Hazara Choudhary; Workshop Practices -, Vol. I & II.
5. Jain. R.K. Production Technology -

BE II nd SEMESTER
BE 27 Constitution of India

Basic features and fundamental principles

TOTAL -60 HOURS

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. **(20 HOURS)**

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India have played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

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social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of Course content **(20 HOURS)**

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions : National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21.