

**DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY
LUCKNOW**



Evaluation Scheme & Syllabus

for

B.Tech. First Year

(Bio-Technology)

On

Choice Based Credit System

(Effective from the Session: 2016-17)

B. Tech. in Biotechnology
First Semester

S. No.	Subject Code	Subject Name	L-T-P	Th/Lab Marks	Sessional		Total	Credit
					Test	Assig/Att.		
1	RBT-103/RBT-102	Elementary Maths-I/ Remedial Biology-I	3-1-0	70	20	10	100	4
2	RAS-101	Engineering Physics-I	3-1-0	70	20	10	100	4
3	REE-101	Basic Electrical Engineering	3-1-0	70	20	10	100	4
4	RAS-104	Professional Communication	3-0-0	70	20	10	100	3
5	REC-101	Basic Electronics	3-1-0	70	20	10	100	4
6	RAS-151	Engineering Physics Lab	0-0-2	50		50	100	1
7	REE-151	Basic Electrical Engineering Lab	0-0-2	50		50	100	1
8	RAS-154	Professional Communication Lab	0-0-2	50		50	100	1
9	RME-151	Workshop Practice	0-0-3	50		50	100	2
	Total						900	24

B. Tech. in Biotechnology
Second Semester

S. No.	Subject Code	Subject Name	L-T-P	Th/Lab Marks	Sessional		Total	Credit
					Test	Assig/Att.		
1	RBT-203/RBT-202	Elementary Maths-II/ Remedial Biology-II	3-1-0	70	20	10	100	4
2	RAS-201	Engineering Physics-II	3-1-0	70	20	10	100	4
3	RME-201	Elements of Mechanical Engg.	3-1-0	70	20	10	100	4
4	RCS-201	Computer System & Programming in C	3-0-0	70	20	10	100	3
5	RAS-202	Engineering Chemistry	3-1-0	70	20	10	100	4
6	RAS-252	Engineering Chemistry Lab	0-0-2	50		50	100	1
7	RME-251	Mechanical Engineering Lab	0-0-2	50		50	100	1
8	RCS-251	Computer Progm. Lab	0-0-2	50		50	100	1
9	RCE-251	Computer Aided Engg. Graphics	0-0-3	50		50	100	2
	Total						900	24

SYLLABUS

RBT-102

Remedial Biology-I

L	T	P
3	1	0

Unit-I:

The cell concept, structure of prokaryotic, eukaryotic cells, plant cells and animal cells, Structure and function of cell membrane, cell organelles and their function. Structure and use of compound microscope, Macro and micro molecules, Basic chemical constituents of living body.

Unit-II:

Tissues in animal and plants, Morphology, anatomy and functions of different parts of plants: Root, stem, leaf, inflorescence, flower, fruit and seed, Concepts of botanical garden, herbaria, zoological park and museums.

Unit-III:

Classification of living organisms (Five kingdom classification, major groups and principles of classification in each kingdom), Systematic and binomial system of nomenclature, Concept of animal and plant classification.

Unit-IV:

Concepts of alleles and genes, Mendelian Experiments, Cell cycle (Elementary Idea), mitosis and meiosis, techniques to study mitosis and meiosis.

Unit-V:

Plant Physiology: Concepts of diffusion, osmosis, imbibitions, Movement of water, food, nutrients and gases, Photosynthesis, plant growth and development.

Recommended Text Book:

1. Biology-Textbook of Class XI, NCERT Publication
2. Biology-Textbook of Class XII, NCERT Publication

Reference Book:

Biology by Peter H Raven, George b Johnson, Kenneth A., Mason, Jonathan Losos, Susan Singer (MacGraw Hill Publication)

Elementary Mathematics-I

L	T	P
3	1	0

UNIT-I: ALGEBRA: Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables-graphically.

UNIT-II : Permutations & Combinations: Fundamental principle of counting. Factorial $n(n!)$. Permutations and combinations, derivation of formulae and their connections, simple applications. Sequence and Series: Arithmetic progression (A. P.). arithmetic mean (A.M.) Geometric progression (G.P.), general term of a G.P., sum of n terms of a G.P., geometric mean (G.M.), relation between A.M. and G.M. Sum to n terms of the special series n , n^2 and n^3 .

UNIT – III : COORDINATE GEOMETRY

1. Straight Lines: Brief recall of 2D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two point form, intercepts form and normal form. General equation of a line. Distance of a point from a line.
2. Conic Sections: Sections of a cone: circle, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.
3. Introduction to Three -dimensional Geometry Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.

UNIT –IV : CALCULUS

Limits and Derivatives: Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of limit. Definition of derivative, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions.

UNIT –V : Continuity and Differentiability: Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concept of exponential and logarithmic functions and their derivative. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations. Applications of Derivatives: Applications of derivatives: rate of change, increasing/decreasing functions, tangents & normals, approximation, maxima and minima (first derivative test motivated geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

Recommended Textbooks.

- 1) Mathematics - Textbook for Class XI, NCERT Publication
- 2) Mathematics Part I - Textbook for Class XII, NCERT Publication
- 3) Mathematics Part II - Textbook for Class XII, NCERT Publication

Reference books:

- 1) Higher engineering mathematics by B.V.Ramana (Tata Macgraw Hill)
- 2) Advanced modern engineering mathemtics by Glyn james (pearson education)

RAS101

ENGINEERING PHYSICS-I

Unit – I: Relativistic Mechanics

08 Hrs.

Inertial & non-inertial frames, Galilean transformations, Michelson-Morley experiment, Einstein's postulates, Lorentz transformation equations, Length contraction & Time dilation, Relativistic addition of velocities; Variation of mass with velocity, Mass energy equivalence, Concept of rest mass of photon.

Unit – II: Modern Physics

10 Hrs.

Black body radiation spectrum, Weins law and Rayleigh-Jeans law, Assumption of quantum theory of radiation, Planck's law. Wave-particle duality, de-Broglie matter waves, Bohr's quantization rule, Phase and Group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation (Time dependent and time independent) – particle in one dimensional potential box, Eigen values and Eigen function.

Unit – III: Wave Optics

10 Hrs.

Interference: Coherent sources, Interference in thin films (parallel and wedge shaped film), Newton's rings and its applications..

Diffraction: Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

Unit – IV: Polarization and Laser

08 Hrs.

Polarization: Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate, Optical Activity, Fresnel's theory, Specific rotation.

Laser: Spontaneous and stimulated emission of radiation, population inversion, Einstein's Coefficients, Concept of 3 and 4 level Laser, Construction and working of Ruby, He-Ne lasers and laser applications.

Unit – V: Fiber Optics and Holography

06 Hrs.

Fiber Optics: Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Single and Multi Mode Fibers, Dispersion and Attenuation.

Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.

Reference Books:

1. Concepts of Modern Physics - Aurthur Beiser (Mc-Graw Hill)
2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly)
3. Optics –Ajoy Ghatak (Tata McGraw Hill Education Private Ltd. New Delhi)

4. Optics - Brijlal & Subramanian (S. Chand)
- 5 Engineering Physics- C. Mani Naidu(Pearson)
6. Lasers Principles, Types and Applications- K R Nambiar (New Age)
7. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New

RAS-151/RAS-251

ENGINEERING PHYSICS LAB

L T P
0 0 2

List of Experiments

Any ten experiments, at least four from each group.

Group -A

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinalpoints.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To study the polarization of light by simple reflection using laser.
7. Measurement of Wavelength of a laser (He- Ne) light using single slit diffraction.

Group – B

8. To determine the specific resistance of a given wire using Carey Foster's bridge.
9. To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil.
10. To verify Stefan's Law by electrical method.
11. To calibrate the given ammeter and voltmeter by potentiometer.
12. To study the Hall effect and determine Hall coefficient, carrier density and - mobility of a given semiconductor using Hall effect set up.
13. To determine the energy band gap of a given semiconductor material.
- 14 To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
15. To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
16. To determine the ballistic constant of a ballistic galvanometer.
17. To determine the coefficient of viscosity of a liquid.
18. Measurement of fiber attenuation and aperture of fiber.
19. High resistance by leakage method.
20. Magnetic Susceptibility of paramagnetic solution.

Unit	Content	Hours
Unit-1	Molecular orbital theory and its applications to homo-nuclear diatomic molecules. Band theory of solids. Liquid crystals and its applications. Point defects in Solids. Structure and applications of Graphite and Fullerenes. Concepts of nano-materials and its applications	8
Unit-2	Polymers: Basic concepts of polymer- blends and composites. Conducting and biodegradable polymers. Preparations and applications of some industrially important polymers (Buna N, Buna S, Neoprene, Nylon 6, Nylon 6,6, Terylene). General methods of synthesis of organometallic compound (Grignard Reagent) and their applications in polymerization.	8
Unit-3	Electrochemistry: Galvanic cell, electrode potential, Lead storage battery. Corrosion, causes and its prevention. Setting and hardening of cement, applications of cement. Plaster of paris. Lubricants- Classification, mechanism and applications..	8
Unit-4	Hardness of water. Disadvantage of hard water. Boiler troubles, Techniques for water softening; Lime-soda, Zeolite, Ion exchange resin, Reverse osmosis. Phase Rule and its application to water system.	8
Unit-5	Fuels; Classification of fuels. Analysis of Coal. Determination of Calorific values (bomb calorimeter & Dulong's method). Biogas. Elementary ideas and simple applications of UV, Visible, IR and ^1H NMR spectral Techniques.	8

Textbook

1. Chemistry for Engineers, by S. Vairam and Suba Ramesh; Wiley India

Reference Books

1. Textbook of Engineering Chemistry by Dr. Gopal Krishna Bhatt, Acme Publishers
2. Chemistry (9th ed), by Raymond Chang, Tata McGraw-Hill
3. Chemistry Concepts and Applications by Steven S. Zumdahl; Cengage Learning
4. Engineering Chemistry, Wiley India
5. Engineering Chemistry Author: Abhijit Mallick, Viva Books
6. Text Book of Engineering Chemistry by Harsh Malhotra; Sonali Publications
7. Concise Inorganic Chemistry by J.D. Lee; Wiley India
8. Organic Chemistry (6 ed) by Morrison & Boyd; Pearson Education
9. Physical Chemistry by Gordon M. Barrow; Mc-Graw Hill

10. Organic Chemistry, Volume 1(6 ed)& 2 (5ed) by I. L. Finar; Pearson Education
11. Atkins' Physical Chemistry by Peter Atkins & Julio De Paula; Oxford University Press

RAS 152/ RAS 252

ENGINEERING CHEMISTRY PRACTICALS

LIST OF EXPERIMENTS

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness in water sample using EDTA ..
3. Determination of available chlorine in bleaching powder.
4. Determination of chloride content in water sample.
5. Determination of iron content in the given solution by Mohr's method.
6. pH- metric titration.
7. Viscosity of an addition polymer like polyester by viscometer.
8. Determination of iron concentration in sample of water by colorimetric method. The method involves the use of KCN as a chelating agent and the measurements are carried out at 480nm.
9. Element detection and functional group identification in organic compounds.
10. Preparation of Bakelite and Urea formaldehyde resin.

Note: Institute can replace two experiments from the aforesaid experiments as per

ELECTRONICS ENGINEERING

Unit	Topics	Lectures
I	PN junction diode: Introduction of Semiconductor Materials Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical, diode resistance, capacitance, Diode Equivalent Circuits, Transition and Diffusion Capacitance, Zener Diodes breakdown mechanism (Zener and avalanche) Diode Application: Series , Parallel and Series, Parallel Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits Special Purpose two terminal Devices :Light-Emitting Diodes, Varactor (Varicap) Diodes, Tunnel Diodes, Liquid-Crystal Displays.	12
II	Bipolar Junction Transistors and Field Effect Transistor: Bipolar Junction Transistor: Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration DC Biasing BJTs: Operating Point, Fixed-Bias, Emitter Bias, Voltage-Divider Bias Configuration. Collector Feedback, Emitter-Follower Configuration. Bias Stabilization. CE, CB, CC amplifiers and AC analysis of single stage CE amplifier (r_e Model). Field Effect Transistor: Construction and Characteristic of JFETs. AC analysis of CS amplifier, MOSFET (Depletion and Enhancement)Type, Transfer Characteristic,	10
III	Operational Amplifiers : Introduction and Block diagram of Op Amp, Ideal & Practical characteristics of Op Amp, Differential amplifier circuits, Practical Op-Amp Circuits (Inverting Amplifier, Non inverting Amplifier, Unity Gain Amplifier, Summing Amplifier, Integrator, Differentiator). OPAMP Parameters: Input offset voltage, Output offset voltage, Input biased current, Input offset current Differential and Common-Mode Operation	6
IV	Electronic Instrumentation and Measurements: Digital Voltmeter : Introduction, RAMP Techniques Digital Multimeters: Introduction Oscilloscope: Introduction, Basic Principle, CRT , Block Diagram of Oscilloscope, Simple CRO, Measurement of voltage, current phase and frequency using CRO, Introduction of Digital Storage Oscilloscope and Comparison of DSO with Analog Oscilloscope.	6
V	Fundamentals of Communication Engineering: Elements of a Communication System, Need of Modulation, Electromagnetic spectrum and typical applications. Basics of Signal Representation and Analysis, Introduction of various analog modulation techniques , Fundamentals of amplitude modulation, Modulation and Demodulation Techniques of AM.	6

Text Books:

1. Robert L. Boylestand / Louis Nashelsky "*Electronic Devices and Circuit Theory*", Latest Edition, Pearson Education.
2. H S Kalsi, "Electronic Instrumentation", Latest Edition, TMH Publication,.
3. George Kennedy, "Electronic Communication Systems", Latest Edition, TMH,

Reference Books:

1. David A. Bell, "*Electronic Devices and Circuits*", Latest Edition, Oxford University Press.
2. Jacob Millman, C.C. Halkias, Staya brataJit, "*Electronic Devices and Circuits*", Latest Edition , TMH.
3. David A. Bell, Electronic Instrumentation and Measurements, Latest Edition, Oxford University Press India.

ELEMENTS OF MECHANICAL ENGINEERING

RME101/EME201

LTP: 3-1-0

Units	Topic	Hrs
Unit I	Engineering Materials: Importance of engineering materials, classification, mechanical properties and applications of Ferrous, Nonferrous and composite materials.	4
	Manufacturing Processes: classification of manufacturing process, working principle of sand casting, hot & cold forging, arc & gas welding and sheet metal forming process.	5
	Lathe: Construction and working principle of lathe, operations perform on lathe.	
Unit II	Basic Thermodynamics: Introduction, work and heat Transfer, Zeroth law and First Law of Thermodynamics, perpetual motion machine of first kind	3
	Second Law of Thermodynamics: Kelvin-plank statement, cyclic heat engine, Clausius' statement, refrigerator and heat pump, Carnot cycle, Carnot Theorem and its corollary.	5
	Entropy: Clausius inequality, property of Entropy, Entropy principle and its applications.	
Unit III	Properties of pure substances: p-v, p-T, T-s and h-s diagram, dryness fraction and steam tables.	4
	Steam Formation: Classification of boilers, comparison of fire and water tube boilers, construction and working principle of Lancashire boiler, Babcock and Wilcox boiler, boiler mountings and accessories.	
	Internal Combustion Engines: Classification of I.C. Engines and their parts, working principle and comparison between 2 Stroke and 4 stroke engine , difference between SI and CI engines. P-V diagrams of Otto and Diesel cycles. indicated power, brake power, mean effective pressure, engine efficiencies, and specific fuel consumption.	5
Unit IV	Introduction: Introduction to Engineering mechanics and its classification. Laws of mechanics. Physical quantities –units and dimensions.	1
	Force System: Force, Classification & Representation, Parallelogram Law, Lami's theorem, Principle of Transmissibility of forces. Moment of a force, Couple, Varignon's theorem, Resolution of a force into a force and a couple. Resultant of coplanar force system. Equilibrium of coplanar force system, Free body diagrams, Determination of reactions.	4
	Friction : Theory of Dry friction, Coulomb's laws of friction, Numerical on Equilibrium of bodies on rough horizontal and inclined plane, ladder and Belt friction.	3
Unit V	Structural Analysis: Plane Truss, Difference between truss and frame, Perfect and imperfect truss, Assumptions and Analysis of Plane Truss by Method of joints and Method of section, Zero force members	3

	Centre of Gravity and Centroid: Determination of centroid by integration problems on Centroid of composite areas.	2
	Moment of Inertia: , Perpendicular axis theorem and Parallel axis theorem, Radius of gyration, Moment of inertia by integration and problems on moment of inertia of composites areas.	3

Reference Books:

1. Manufacturing engineering and technology By Serope Kalpakjian, Steven R. Schmid, PEARSSON Publications
2. Elements of Workshop Technology by Hajra Choudhary Media Promotor
3. Engineering Thermodynamics by P.K.Nag, Mc Graw Hill Pub.
4. Engineering Thermodynamics by P. Chattopadhyay, OXFORD Publication
5. Internal Combustion Engine by V Ganesan, Mc Graw Hill Pub
6. Engineering Mechanics By S. S. Bhavikatti, K. G. Rajashekarappa New age International
7. Engineering Mechanics by R K Bansal Laxmi Publications
8. Basic Mechanical Engineering by Pravin Kumar PEARSSON Publications

ELEMENTS OF MECHANICAL ENGINEERING LAB (RME151/RME251)

LTP: 0-0-2

Total Hrs: 22

Note: Minimum of 5 experiments to be conducted from each module

Module 1:

1. Study and Demonstration of mechanical properties using UTM
2. Study and Demonstration of mechanical properties using Hardness/Impact apparatus
3. Study and Demonstration of Babcock and Wilcox and Lancashire boiler
4. Study and Demonstration of various types of Mounting and Accessories of Boilers.
5. Study and Demonstration double acting steam engine.
6. Study and Demonstration of 2 stroke Diesel and Petrol engine.
7. Study and Demonstration of 4 stroke Diesel and Petrol engine

Module 2:

1. To verify the parallelogram, Triangle law and Lami's Theorem.
2. To verify the polygon law of force.
3. To determine the coefficient of friction on inclined surface.
4. To determine the coefficient of friction on belt/rope friction.
5. To determine the efficiency and Mechanical Advantage of Worm & worm-wheel experiment for lifting loads
6. Force Analysis on simple truss and Jib-crane Apparatus.

COURSE OUTCOMES

1. Solve and analyze the DC & AC electrical circuits using KVL/KCL and network theorems.
2. Solve and analyze the behavior of AC electrical circuits and resonance.
3. Apply the concepts of measurements in measuring electrical quantities.
4. Solve and analyze the behavior of magnetic circuits and demonstrate the working of single phase transformers, auto-transformer and their applications.
5. Demonstrate the working principles of basic electrical machines including DC as well as AC machines and identify the type of electrical machine used for a particular application.

DETAILED SYLLABUS

Unit-I : Electrical Circuit Analysis:

Introduction, Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, Source transformation, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation,

AC fundamentals: Sinusoidal, square and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidally varying voltage and current.

Unit-II: Steady- State Analysis of Single Phase AC Circuits:

Analysis of series and parallel RLCCircuits, Concept of Resonance in series & parallel circuits, bandwidth and quality factor; Apparent, active & reactive powers, Power factor, Concept of power factor improvement and its improvement (Simple numerical problems)

Network theorems (AC & DC with independent sources): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem (Simple numerical problems)

Unit-III : Three Phase AC Circuits:

Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power and its measurement (simple numerical problems).

Measuring Instruments: Types of instruments, Construction and working principles of PMMC and moving iron type voltmeters & ammeters, Single phase dynamometer wattmeter, Use of shunts and multipliers (Simple numerical problems on shunts and multipliers)

Unit-IV: Magnetic Circuit: Magnetic circuit concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis and eddy current losses, Magnetic circuit calculations (Series & Parallel).

Single Phase Transformer: Principle of operation, Construction, EMF equation, Equivalent circuit, Power losses, Efficiency (Simple numerical problems), Introduction to auto transformer.

Unit-V: Electrical Machines:

DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)

Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only)

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.

Text Books:

1. "Basic Electrical Engineering", S N Singh; Prentice Hall International
2. "Basic Electrical Engineering", Kuldeep Sahay, New Age International Publishers
3. "Fundamentals of Electrical Engineering", B Dwivedi, A Tripathi; Wiley India
4. "Principles of Electrical Engineering", V. Del Toro; Prentice Hall International
5. "Electrical Engineering", J. B. Gupta, Kataria and Sons

Reference Books:

1. "Electrical and Electronics Technology", Edward Hughes; Pearson
2. "Engineering Circuit Analysis", W.H. Hayt & J.E. Kimerly; Mc Graw Hill
3. "Basic Electrical Engineering", C L Wadhwa; New Age International
4. "Basic Electrical Engineering", T.K. Nagsarkar, M.S. Shukhija; Oxford University Press

COURSE OUTCOMES

At the end of the course, the student should be able

- Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits.
- Demonstrate the working of various measuring instruments like ammeter, voltmeter, wattmeter, energy meter etc.
- Conduct experiments illustrating the working of magnetic circuits, single phase transformers and auto-transformers.
- Conduct experiments illustrating the behavior of DC and AC machines and identify the type of electric machine used for a particular application.

LIST OF EXPERIMENTS

Note: A minimum of ten experiments from the following should be performed

1. Verification of Kirchhoff's laws
2. Verification of Superposition theorem
3. Verification of Thevenin's Theorem and Maximum Power Transfer Theorem.
4. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
5. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
6. Connection and measurement of power consumption of a fluorescent lamp (tube light).
7. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
8. Determination of parameters of ac single phase series RLC circuit
9. To observe the B-H loop of a ferromagnetic material in CRO.
10. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
11. Determination of efficiency of a dc shunt motor by load test
12. To study running and speed reversal of a three phase induction motor and record speed in both directions.

RCS101/RCS201

Computer System and Programming in C

L T P

3 0 0

Unit1:

(10 Lectures)

Basics of Computer: Introduction to digital computer, basic operations of computer, functional components of computer, Classification of computers.

Introduction to operating system: [DOS, Windows, Linux and Android] purpose, function, services and types.

Number system: Binary, octal and hexadecimal number systems, their mutual conversions, Binary arithmetic.

Basics of programming: Approaches to Problem Solving, Concept of algorithm and flow charts, Types of computer languages:- Machine Language, Assembly Language and High Level Language, Concept of Assembler, Compiler, Loader and Linker.

Unit2:

(8 Lectures)

Standard I/O in “C”, **Fundamental data types-** Character type, integer, short, long, unsigned, single and double floating point, Storage classes- automatic, register, static and external, Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.

Fundamentals of C programming: Structure of C program, writing and executing the first C program, Components of C language. Standard I/O in C.

Unit3:

(10 Lectures)

Conditional program execution: Applying if and switch statements, nesting if and else, use of break and default with switch, program loops and iterations: use of while, do while and for loops, multiple loop variables, use of break and continue statements.

Functions: Introduction, types of functions, functions with array, passing values to functions, recursive functions.

Unit 4:

(6 Lectures)

Arrays: Array notation and representation, manipulating array elements, using multi dimensional arrays. Structure, union, enumerated data types

Unit 5:

(8 Lectures)

Pointers: Introduction, declaration, applications File handling, standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler.

Reference:

1. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education .
2. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited – 2015.
3. Programming in C by Kochan Stephen G. Pearson Education – 2015.

4. Computer Concepts and Programming in C by D.S. Yadav and Rajeev Khanna, New Age International Publication .
5. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
6. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication
7. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
8. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning - 2007.
9. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
10. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication
11. Computer Fundamental and C programming by K K Gupta, Acme Learning Publication

RCS151/RCS251

Computer Programming Lab

- 1.WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
- 2.WAP that calculates the Simple Interest and Compound Interest. The Principal , Amount, Rate of Interest and Time are entered through the keyboard.
- 3.WAP to calculate the area and circumference of a circle.
- 4.WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5=(F-32)/9$.
- 5.WAP that swaps values of two variables using a third variable.
- 6.WAP that checks whether the two numbers entered by the user are equal or not.
- 7.WAP to find the greatest of three numbers.
- 8.WAP that finds whether a given number is even or odd.
- 9.WAP that tells whether a given year is a leap year or not.
- 10.WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:
Between 90-100%-----Print 'A'
80-90%-----Print 'B'
60-80%-----Print 'C'
Below 60%-----Print 'D'
- 11.WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.
- 12.WAP to print the sum of all numbers up to a given number.
- 13.WAP to find the factorial of a given number.
- 14.WAP to print sum of even and odd numbers from 1 to N numbers.
- 15.WAP to print the Fibonacci series.
- 16.WAP to check whether the entered number is prime or not.
- 17.WAP to find the sum of digits of the entered number.
- 18.WAP to find the reverse of a number.
- 19.WAP to print Armstrong numbers from 1 to 100.
- 20.WAP to convert binary number into decimal number and vice versa.

21. WAP that simply takes elements of the array from the user and finds the sum of these elements.
22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
23. WAP to find the minimum and maximum element of the array.
24. WAP to search an element in a array using Linear Search.
25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.
26. WAP to add and multiply two matrices of order $n \times n$.
27. WAP that finds the sum of diagonal elements of a $m \times n$ matrix.
28. WAP to implement `strlen ()`, `strcat ()`, `strcpy ()` using the concept of Functions.
- 23
29. Define a structure data type `TRAIN_INFO`. The type contains Train No.: integer type Train name: string Departure Time: aggregate type `TIME` Arrival Time : aggregate type `TIME` Start station: string End station : string The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations:
 - (i) List all the trains (sorted according to train number) that depart from a particular section.
 - (ii) List all the trains that depart from a particular station at a particular time.
 - (iii) List all the trains that depart from a particular station within the next one hour of a given time.
 - (iv) List all the trains between a pair of start station and end station.
30. WAP to swap two elements using the concept of pointers.
31. WAP to compare the contents of two files and determine whether they are same or not.
32. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

Professional Communication

S.No.	Unit	Contents
1	Unit-1 Fundamentals of Communications	Technical Communication: features: Distinction between General And Technical Communication; Language as a tool of communications; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of communication: Downward, Upward, Lateral/Horizontal (Peer group) : Importance of technical communication; Barriers to Communication.
2	Unit-II Written Communication	Words and Phrases: Word formation, Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Transformation of sentences; Requisites f Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial , Linear, Chronological etc.
3	Unit-III Business Communication	Principles, Sales & Credit letters; Claim and Adjustment Letters; Job Application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance; Negotiation skills.
4	Unit-IV Presentation Strategies and Soft Skills.	Nuances and Modes of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Interpersonal communication: Definition; Types; Team work; Attitude; Way to improve Attitude Listening Skills : Types; Methods for improving Listening Skills.
5	Unit –V Value- Based Text Readings	Following essays from the prescribed text book with emphasis on Mechanics of writing. (i) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior (ii) The Language of Literature and Science by A. Huxley (iii) Man and Nature by J. Bronowski (iv) Science and Survival by Barry Commoner (v) The Mother of the Sciences by A.J. Bahm.
6	Text Book	1. Improve your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi. 2. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi. 3. Functional skills in Language and Literature, by R.P. Singh, Oxford Univ. Press, 2005, New Delhi.
7	Reference Books	1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt. Ltd, 2011, New Delhi. 2. Business Correspondence and Report Writing by Prof. R.C.,Sharma & Krishna Mohan, Tata McGraw Hill & Co.

		<p>Ltd. , 2001, New Delhi.</p> <ol style="list-style-type: none">3. Word Power Made Easy by Norman Lewis, W.R. Goyal Pub. & Distributors, 2009, Delhi.4. Developing Communication skills by Krishna Mohan, Meca Bannerji- Macmillan India Ltd. 1990, Delhi.5. Manual of Practical Communication by L.U.B. Pandey: A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi.6. English Grammar and Usage by R.P.Sinha, Oxford University Press, 2005, New Delhi.7. Spoken English- A manual of Speech and Phonetics by R.K. Bansal & J.B. Harrison Orient Blackswan, 2013, New Delhi.
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RAS154/RAS254

PROFESSIONAL COMMUNICATION LABORATORY PRACTICALS

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A)

LIST OF PRACTICALS

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics / Kinesics.
4. Presentation Skills of Technical Paper/Project Reports/Professional Reports based on proper Stress and Intonation Mechanics.
5. Official /Public Speaking based on Rhythmic Patterns.
6. Theme-Presentation /Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehensions Skills based on Reading and Listening Practicals on a model Audio-Visual Usage.

Reference Books

1. Bansal R.K.& Harrison: Phonetics in English, Orient Longman , New Delhi.
2. Sethi & Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi.
3. L.U.B. Pandey & R.P.Singh, A Manual of Practical Communication, A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

1. Carpentry Shop:

1. Study of tools & operations and carpentry joints. 2. Simple exercise using jack plane. 3. To prepare half-lap corner joint, mortise & tennon joints. 4. Simple exercise on woodworking lathe.

2. Fitting (Bench Working) Shop:

1. Study of tools & operations 2. Simple exercises involving fitting work. 3. Make perfect male-female joint. 4. Simple exercises involving drilling/tapping/dieing.

3. Black Smithy Shop:

1. Study of tools & operations 2. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

4. Welding Shop:

1. Study of tools & operations of Gas welding & Arc welding 2. Simple butt and Lap welded joints. 3. Oxy-acetylene flame cutting.

5. Sheet-metal Shop:

1. Study of tools & operations. 2. Making Funnel complete with 'soldering'. 3. Fabrication of tool-box, tray, electric panel box etc.

6. Machine Shop:

1. Study of Single point cutting tool, machine tools and operations. 2. Plane turning. 3. Step turning 4. Taper turning. 5. Threading

7. Foundry Shop:

1. Study of tools & operations 2. Pattern making. 3. Mould making with the use of a core. 4. Casting

Introduction

Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning line conventions and free hand practicing, AUTO CAD, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints.

2 – Sheets Orthographic Projections Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes

2 – Sheets Orthographic Projections of Plane Surfaces (First Angle Projection Only)

Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only.

1 – Sheet Projections of Solids (First Angle Projection Only) Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions.

2-Sheets Sections And Development of Lateral Surfaces of Solids Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP.

1 – Sheet Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres.

1-Sheet

Text Books

1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat.
2. Computer Aided Engineering Drawing - S. Trymbaka Murthy, -I.K International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.

Reference Books

1. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.
 2. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005-Prentice-Hall of India Pvt. Ltd., New Delhi.
- Engineering Drawing – M.B. Shah, B.C.Rana, 2nd Edition, 2

SYLLABUS

RBT-202

Remedial Biology-II

L	T	P
3	1	0

Unit-I:

Brief history of microbiology, Types of microorganisms, Basic idea of domain bacteria, proteobacteria, non proteobacteria Gram –ve and Gram +ve bacteria, lichens, algae, protozoa, helminthes, viral structures, viral multiplication, Role of microorganisms in the production of industrial chemicals and pharmaceuticals.

Unit-II:

Functional Anatomy of Prokaryotic and Eukaryotic Cells: Size, shape, and arrangement of bacterial cells. Structure and function of cells.

Unit-III:

Catabolic & anabolic reactions: enzymes, energy production and carbohydrate metabolism. Lipid & protein catabolism, Energy production mechanism, metabolic diversity & pathways of energy use. Integration of metabolism.

Unit-IV:

Energy Utilization: Structure of mitochondria, cellular respiration, relationship of carbohydrate metabolism to other compounds, Glycolysis, formation of acetyl co-A, Krebs cycle, Electron Transport System and Oxidative Phosphorylation, ATP, factors affecting respiration.

Unit-V:

Reproductive health and human welfare: Population and birth control, sexually transmitted diseases, infertility, Cancer and AIDS, Basic concepts of immunology, vaccines.

Recommended Text Book:

1. Biology-Textbook of Class XI, NCERT Publication
2. Biology-Textbook of Class XII, NCERT Publication
3. Microbiology- Pelzar, Tata Mcgraw- Hill Publishing Com. Ltd., 2002
4. An introduction to immunology by C.V. Rao, Narosa publishing house

Reference Book:

Biology by Peter H Raven, George b Johnson, Kenneth A., Mason, Jonathan Losos, Susan Singer (MacGraw Hill Publication)
General Microbiology: Stainier, Adelberq and Ingraham.

Elementary Mathematics-II

L	T	P
3	1	0

UNIT-I: Integrals: Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type to be evaluated. Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals. Applications of the Integrals: Applications in finding the area under simple curves, especially lines, areas of circles/parabolas/ellipses (in standard form only), area between the two above said curves (the region should be clearly identifiable).

UNIT –II: Differential Equations

Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type: $\frac{dy}{dx} + py = q$, where p and q are functions of x.

UNIT-III: VECTORS: Vectors and scalars, magnitude and direction of a vector. Direction cosines/ratios of vectors. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors.

UNIT-IV: THREE-DIMENSIONAL GEOMETRY

Three - dimensional Geometry: Direction cosines/ratios of a line joining two points. Cartesian and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes. (iii) a line and a plane. Distance of a point from a plane.

UNIT –V : PROBABILITY

Random experiments: outcomes, sample spaces (set representation). Events: occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events Axiomatic (set theoretic) probability, connections with the theories of earlier classes. Probability of an event, probability of 'not', 'and' & 'or' events. Multiplication theorem on probability. Conditional probability, independent events, total probability, Baye's theorem, Random variable and its probability distribution, mean and variance of haphazard variable. Repeated independent (Bernoulli) trials and Binomial distribution.

Recommended Textbooks.

1) Mathematics - Textbook for Class XI, NCERT Publication

- 2) Mathematics Part I - Textbook for Class XII, NCERT Publication
- 3) Mathematics Part II - Textbook for Class XII, NCERT Publication

Reference books:

- 1) Higher engineering mathematics by B.V.Ramana (Tata Macgraw Hill)
- 2) Advanced modern engineering mathemtics by Glyn james (pearson education)

RAS-201

ENGINEERING PHYSICS- II

Unit – I: Crystal Structures and X-ray Diffraction 10Hrs.

Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Co-ordination number, Atomic radius and Packing factor of different cubic structures, Crystal structure of NaCl and diamond, Lattice planes and Miller Indices, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer. Compton Effect.

Unit – II: Dielectric and Magnetic Properties of Materials 10Hrs.

Dielectric Properties: Dielectric constant and Polarization of dielectric materials, Relation between E, D and P, Types of Polarization (Polarizability). Equation of internal fields in liquid and solid (One- Dimensional), Claussius-Mossotti equation, Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material, Ferroelectricity, Piezoelectricity.

Magnetic Properties: Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications.

Unit – III: Electromagnetic Theory 06 Hrs.

Equation of continuity, Maxwell's Equations (Integral and Differential Forms) and its derivations, Displacement Current, Poynting vector and Poynting theorem, EM - Wave equation and its propagation characteristics in free space, non-conducting and conducting media, energy density of electromagnetic wave, Skin depth.

Unit – IV: Band Theory of Solids 06 Hrs.

Free electron Theory, Formation of bands in Solids, Classification of solids on band theory, Density of states, Fermi-Dirac distribution, Concept of effective mass, Charge carrier density (electrons and holes), Conductivity of semiconductors, carrier concentrations Fermi energy, Position of Fermi level in intrinsic and in extrinsic semiconductors. Temperature dependence of conductivity in semiconductors.

Unit – V: Physics of some technologically important Materials 08Hrs.

Superconductors: Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, London equations, Josephson theory, persistent currents, Type I and Type II superconductors, BCS theory (Qualitative), High temperature superconductors and Applications of Super-conductors.

Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene, Carbon nanotubes Single and double walled nanotubes, synthesis of nanotubes, Properties and Applications of nanotubes.

Reference books:

1. Concept of Modern Physics - by Beiser (Tata Mc-Graw Hill)

2. Solid State Physics - by C. Kittel, 7th edition (Wiley Eastern)
3. Materials Science and Engineering - by V. Raghavan (Prentice- Hall India)
4. Solid State Physics - by S.O. Pillai, 5th edition (New Age International)
5. Introduction to Electrodynamics - by David J. Griffith (PH I)
6. Engineering Physics- C. Mani Naidu(Pearson)
7. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New Delhi)