

Subject Code	Subject Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3AE01	English Communication	3	0	0	3	3

Unit-I

Grammar: Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations, Voices, narration, clauses, modals. (Practical exercises on grammar).

Unit-II

Vocabulary: Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, phrases, Common Errors. Derivation from root words, , Proverbs, Scientific Jargon. (Practical exercises on vocabulary).

Unit-III

Developing Reading Skills : Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, Reading comprehension and SQ3R reading technique. (Practical Reading comprehension).

Unit-IV

Developing Writing Skills: Developing logical paragraphs, art of condensation, précis, essay, Business Correspondence , Business Letters, Parts & Layouts of Business Letters, Writing Resume, E-mails.
(Practical on précis and paragraph writing).

Unit-V

Appreciating Literature: Poetry: The Solitary Reaper - William Wordsworth/Where the mind is without fear - Rabindranath Tagore/ Ozymandias - Percy Bysshe Shelley. Prose: On Courage – A. G. Gardiner/ On Saying ‘Please’/On Friendship – Francis Bacon. Short stories: Khushwant Singh - The Mark of Vishnu/ The last leaf - O Henry/The Man Who Had No Eyes - MacKinlay Kantor.

Text Books

1. Kumar Sanjay, PushpaLata. English for Effective Communication. Oxford UP. New Delhi.
2. Thompson A.J, A. V. Martinet. A Practical English Grammar. Oxford UP. New Delhi.
3. Bacon Francis. The Essays. Penguin Classics.
4. Singh, Khushwant. The Mark of Vishnu: Stories. Penguin Books.
5. Tagore, Rabindranath. Best of Rabindranath Tagore box set. Srishti Publishers, Oxford University Press

References Books

1. Wren P.C, N.D.V. Prasada Rao. High School English Grammar & Composition. S Chand and Co Pvt Ltd
2. Rai U S, Rai SM. Effective Communication. Himalaya Publishing House.

3. Korlahalli J.S., Rajendra Pal. Essentials of Business Communication All Courses. Sultan Chand & Sons
4. Krishna Mohan, Sharma R C. Business Correspondence and Report Writing. McGraw Hill Education, New Delhi. Fourth Edition.
5. Bovee and Thill. Business Communication Today. Pearson Education
6. Garner Bryan A. HBR Guide to Better Business Writing. Harvard Business Review Press

Subject Code	Subject Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO01	Computer Fundamentals	4	0	4	8	6

Unit-I

Introduction to Information Technology: Information concepts & Processing: Basic concepts of IT, data Processing, data and information. Elements of computer system: Classification, history and types of computers. Hardware: CPU, Memory unit, I/O devices, auxiliary storage devices, data representation Software: System and Application s/w and utility packages.

Unit-II

Operating System: Introduction, Basic functions of OS, Classification of OS. Client server systems, Computer networks, network protocols, LAN, WAN, Internet facilities through WWW, scripting languages, communication channels, factors affecting communication among devices.

Unit-III

Introduction to Viruses: Worms, Malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, Hacking Spamming, Cyber Defamation, Security measures Firewall, Computer Ethics & Good Practices.

Unit-IV

Data base Management System : Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data dictionary, DBA

Unit-V

Cloud Computing : Definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing.

Text Books:

1. E Balagurusamy, Fundamentals of Computers ,TMH
2. Silakari and Shukla, Basic Computer Engineering, Wiley India
3. V Rajaraman, Fundamentals of Computers ,PHI

References:

1. Sanders, D.H. , Computers Today, McGraw Hill.
2. Prof. Vikram Singh, Impact of Information & Communication Technology on public life (1st Edition) Lakshmi Publications
3. Galvin P., J.L. Abraham Silberschatz. Operating System Concepts, John Wiley & Sons Company
4. Elmasri&Navathe Fundamentals of Database systems
5. Buyya, Selvi , Mastering Cloud Computing ,TMH Pub.

Subject Code	Subject Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO02	Problem Solving and Programming-I	3	1	4	8	6

Unit-I

Introduction to Problem Solving: Problem solving strategies, Problem identification, Problem understanding, Algorithm development, Solution planning (flowcharts, pseudocode, etc.), Modular programming design.

Unit –II

Basics of programming: Character set, Constants, Variables, keywords, identifiers literals. Instructions: Type Declaration Instruction, arithmetic Integer Long Short, Signed unsigned, storage classes, Integer and Float Conversions, type conversion in assignment, hierarchy of operations.

Unit –III

Decision control structure: control instructions, if, if-else, use of logical operator, hierarchy of logical operators, arithmetic operators, relational operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, special operators, “&,*,,>,” “sizeof” Loops control structure: while loop, for loop, do – while loop, odd loop, nested loop, break, continue, case control structure, go to, exit statement.

Unit-IV

Array: what are arrays , array initialization, bound checking 1D array, 2D array initialization of 1D and 2D array, memory map of 1D and 2D array, Multidimensional array. Strings: what are strings, standard library string function strlen(), strcpy(), strcat(), strcmp(), 2D array of characters.

Unit-V

Structure: Why use structure, declaration of structure, accessing structure elements, how structure elements are stored, array of structure, uses of structure. Preprocessor: features of Preprocessor, macro expansion, micro with arguments, file inclusion, conditional, #if, #elif, miscellaneous directives, #include, #define, directives, #undef, #pragma directives. Union: Union definition & declaration, accessing a union member, union of structures, initialization of union member, uses of union, use of user defined data types.

Text Books

1. R.G. Dromey, How to Solve it by Computer, Pearson Education
2. B.W. Kernighan and D. M. Ritchie, The C Programming Language, Pearson Education.
3. B. Gottfried, Programming with C , 2nd Edition, (Indian Adapted Edition), TMH .

References Books

1. H. Schildt C, The Complete Reference, Tata McGraw Hill.
2. E. Balaguruswamy, Programming in C, Tata McGraw Hill.
3. Y. Kanetkar, Let us C, BPB Publications.
4. Practical C Programming, 3rd Edition, A Nutshell Handbook O’Relly.
5. A. N Kamthaneet. al, Computer Programming and IT, Pearson Education, 2011.

Subject Code	Subject Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO03	Mathematics -I	3	1	0	4	4

Unit-I

Theory of Equations: Relation between the roots and coefficients of a general polynomial equation in one variable, Transformation of equations, Descarte's rule of signs, Cardan's Method, Ferrari's Method.

Unit-II

Matrices : Rank of a matrix, Eigen values, Eigen vectors, Characteristic equation of a matrix, Cayley Hamilton theorem and its use in finding inverse of matrix, Application of matrix to a system of linear (both homogenous and non - homogenous) equations, Theorems on consistency and inconsistency of a system of linear equations, solving the linear equations with three unknowns.

Unit-III

Elementary Calculus – I : Continuity of function of one variable, Properties of continuous function, Uniform continuity, Chain Rule of differentiability, Mean value theorems and their geometrical interpretations, Darboux's Intermediate Value Theorem for derivatives.

Unit-IV

Elementary Calculus – II: Successive differentiation, Leibnitz theorem, Maclaurin and Taylor series expansions, Tangents and Normals, Asymptotes, Curvature, Evolute and Involute.

Unit-V

Elementary Calculus – III: Definite Integrals, Integration as a limit of sum, Beta Gamma function, Reduction formulae.

Text Books

1. Chandrika Prasad, A Text Book on Algebra and Theory of Equations, Pothishala.
2. Gorakh Prasad, Differential Calculus, Pothishala
3. Gorakh Prasad, Integral Calculus, Pothishala.

References Books

1. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & sons
3. B. Bhattacharya, S. K. Jain and S.R. Nagpaul, First Courses in Linear Algebra, Wiley Eastern.
4. R.S. Verma and K.S. Shukla, Text Book on Trigonometry, Pothishala.
5. B.S. Grewal, Higher Engineering Mathematics. Khanna Publishers.

Subject Code	Subject Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
BC3CO04	Physics-I	4	0	2	6	5

Unit-I

Mathematical Physics: Addition, subtraction and product of two vectors, Polar and axial vectors and their examples from physics, Triple and quadruple product (without geometrical applications), Scalar and vector fields, Differentiation of a vector, Repeated integral of a function of more than one variable, Unit tangent vector and unit normal vector, Gradient, Divergence and Curl, Laplacian operator, Idea of line, surface and volume integrals, Gauss', Stokes' and Green's Theorems.

Unit-II

Mechanics: Displacement, Time and Average Velocity (x-t graph illustrations to be included), Instantaneous Velocity (Finding of velocity on an x-t graph), Average and Instantaneous Acceleration (Illustration with v-t and a-t graph), Motion with Constant Acceleration (Illustration with a-t and v-t graph), Freely Falling Bodies (Up and down motion in fall with y-t and vy-t graph), Velocity and Position by Integration, Position and Velocity Vectors, Acceleration Vector, Components of velocity and acceleration in different coordinate systems. Newton's Laws of motion : Explanation with problems, various types of forces in nature (explanation), Pseudo Forces (e.g. Centrifugal Force), Coriolis force and its applications. Motion under a central force, Derivation of Kepler's laws. Gravitational law and field, Potential due to a spherical body. Gauss & Poisson's equation of Gravitational self-energy. System of particles, Centre of mass and reduced Mass. Elastic and inelastic collisions.

Unit-III

General Properties of Matter: Elasticity: Hook's law and coefficient of elasticity; Young's modulus, Bulk modulus and Modulus of rigidity; Work done during longitudinal strain, volume strain, and shearing strain; Poisson's ratio; Relation between three elastic moduli (Y, η , K); Determination of Y of rectangular thin bar loaded at the center; Torsional oscillations, Torsional rigidity of a wire, to determine η by torsional oscillations.

Surface Tension: Surface Tension, Angle of Contact, Capillary Rise Method; Energy required to raise a liquid in capillary tube; Factors affecting surface tension; Jeager's method for Determination of surface tension; Applications of Surface Tension.

Viscosity and Fluid Mechanics: Concept of Viscous Forces and Viscosity; Steady and Turbulent Flow, Reynolds's number; Equation of Continuity; Bernoulli's Principle; Application of Bernoulli's equation for Speed of Efflux, Venturimeter, Aspirator Pump, Change of plane of motion of a spinning ball.

Unit-IV

Oscillations: Concept of Simple, Periodic & Harmonic Oscillation with illustrations, Differential equation of harmonic oscillator, Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring, Translational and Rotational motion, Moment of Inertia and their Product, Principal moments and axes, Motion of Rigid Body, Euler's equation.

Unit-V

Relativistic Mechanics: Michelson-Morley experiment and its outcome, Postulates of Special Theory of Relativity, Lorentz Transformations. Simultaneity and order of events, Lorentz contraction, Time dilation, Relativistic transformation of velocity, frequency and wave number, Relativistic addition of velocities, Variation of mass with velocity.

Text Books

1. Arken, weber and Harris, Mathematical methods for Physicists, Elsevier.
2. L.D. Landau and E. M. Lifshitz, Mechanics: course of theoretical Physics Vol 1, Pergamon press.
3. R. C. Brown, Mechanics and properties of matter, Longmans Green & Co.
4. M. Ghosh and D. Bhattacharya, A text book of oscillations waves and acoustics, S chand publishing.
5. A. Das, The special theory of relativity, Springer.
6. Resnick Halliday and Walker , Physics , Willey

References Books

1. Sears and Zeemansky, University Physics, XIth edition, Pearson Education
2. H.C. Varma, Concepts of Physics, BharatiBhavan Publishers
3. P.K. Srivastava, Problems in Physics, Wiley Eastern Ltd.
4. Mott Robert, Pearson Benjamin Cummir, Applied Fluid Mechanics, VIth Edition, Pearson Education/Prentice Hall International, New Delhi
5. D.S. Mathur, Properties of Matter, ShamlalChritable Trust, New Delhi
6. D.S. Mathur, Mechanics,S Chand and Company, New Delhi-5
7. A. Einstein, Relativity: The special and general theory, Henry holt and company.
8. Charles Kittel, Mechanics Berkeley Physics Course , TMH

List of Practical:

1. To determine the Standard deviation of given result, of any one of the following, by algebraic formula and histogram.
 - a. Vernier Calipers
 - b. Screw Gauge
 - c. Spherometer
2. To verify laws of parallel and perpendicular axes for moment of inertia.
3. To determine acceleration due to gravity and the radiation of gyration to the centre of gravity using compound pendulum.
4. To determine damping coefficient using a bar pendulum.
5. To determine the depression of a beam and hence to determine the Young's modulus of material of beam using Spherometer.
6. To determine the co-efficient/modules of rigidity of a wire using Torsional pendulum by static method.
7. To determine Surface Tension by Jager's method.
8. To plot displacement/velocity/acceleration as a function of time using M.S. Excel or C++.