68101/68151

ENGLISH

(Common to all Branches)

Instruction	:	3 Periods / week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives:

The first year B.Tech English course helps students to enhance Listening, Speaking, Reading and Writing (LSRW) skills for communicating effectively to meet the following objectives:

1. Improving students' proficiency in English required for technical education.
2. Building up academic competence and confidence to use language effectively.
3. Developing life skills in them to tackle different mental and emotional challenges.
4. **Reading:**
   I. Students will develop understanding of key concepts related to language structures and language usage.
   II. Students will deploy and interpret textual features in ways such as composing and comprehending the prescribed text, and learning new vocabulary.
5. **Writing:**
   Students will be able to write grammatically correct, stylistically pleasing and diverse sentences, free from punctuation and spelling errors.

Text Book - *Fluency in English: A Course book for Engineering Students, published by Orient Black Swan Pvt. Ltd.*

Unit I

1. Presidential Address - A.P.J. Abdul Kalam.
2. Double Angels - David Scott.
3. **Vocabulary:** Prefixes, Suffixes and Collocations.
4. **Grammar:** Parts of speech and Punctuation.
5. **Reading & Writing:** Techniques for Effective Reading and Paragraph writing.

Unit II

1. Satya Nadella's E-mail to His Employees on His First Day as CEO of Microsoft - Satya Nadella.
2. The Road Not Taken - Robert Frost.

3. **Vocabulary:** Homonyms, Homophones, Homographs, Synonyms and Antonyms.
4. **Grammar:** Sentence structures and types of Verbs
5. **Reading & Writing:** Comprehension passages and E-mails.

Unit III

1. Technology with a Human Face - E.F. Schumacher.
2. **Vocabulary:** Commonly confused words and misspelled words
3. **Grammar:** Tenses: Types and uses & Question Tags.
4. **Reading & Writing:** Reading Practice and Official Letter Writing

Unit IV

1. Good Manners - J.C.Hill.
2. If - Rudyard Kipling.
3. **Vocabulary:** Idioms
4. **Grammar:** Subject Verb Agreement, Common Errors in Non-Pronoun Agreement, Articles, Prepositions and Redundancies and Clichés.
5. **Reading and Writing:** Reading Practice and Essay Writing

Unit V

1. Oh Father, Dear Father - Raj Kinger.
2. Basic Education - M.K. Gandhi.
3. **Vocabulary:** One word substitutes
4. **Grammar:** Degrees of Comparison, Active and Passive Voice and Reported Speech.
5. **Reading & Writing:** Reading Practice and Dialogue Writing

Course Outcomes: At the end of the semester, the students will be able to

CO 1: Write coherent, unified, and complete sentences.
CO 2: Identify word meaning and know the use of familiar lexical items.
CO 3: Understand explicit and implicit information and draw inferences for the given task.
CO 4: Communicate according to place, relation and medium.
CO 5: Know, emphasize, conceptualize, comprehend, apply, synthesize, and evaluate the given text, and other authentic texts such as magazines/newspaper articles.

Reference Books:

1. Remedial English Grammar, F.T. Wood, Macmillan.
2. Practical English Usage, Michael Swan, Oxford University Press.

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APPLIED PHYSICS

(Common to EEE, ECE, CSE, EIE & IT Branches)

Instruction	:	3 Periods / week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives: By studying this course a student would be exposed to

1. Basic concepts of lasers, construction and working of different types of lasers followed by the principles of fiber optics.
2. Basic concepts of quantum physics leading to the band theory of solids.
3. Semiconductor physics, Physics of pn junction and characteristics of different types of diodes.
4. Construction and working of bipolar transistor, JFET & MOSFET.
5. Fundamentals of nanomaterials, synthesis and their characterization.

Unit I - Lasers and Fiber optics

Characteristics of laser light, stimulated absorption, spontaneous and stimulated emission of radiation, meta-stable state, population inversion, evaluation of relation between Einstein coefficients, Ruby laser, He-Ne laser, Semiconductor laser: Homo junction and Hetero junction, Applications of lasers.

Structure of optical fiber, principle of propagation of light through optical fiber, acceptance angle, numerical aperture, types of optical fibers: step index and graded index. Losses in optical fibers, optical fiber communication and application of optical fibers.

Unit II - Quantum mechanics and Band theory of solids

The wave properties of matter, Schrodinger time independent wave equation, particle in 1-dimensional box, density of energy states, Fermi-Dirac distribution function and its variation with temperature.

The classical free electron theory, electrical conductivity of a metal: relaxation time, collision time and mean free path. Quantum theory of free electrons. Electron in a periodic potential, Bloch theorem,

Kronig-Penny model, E-K curve, the effective mass of electron and hole (qualitative based on E-K curve), origin of energy bands, classification of solids into conductors, semiconductors and insulators.

Unit III - Conduction in semiconductors and Semiconductor diode characteristics

Introduction to semiconductors, carrier concentration in intrinsic and extrinsic semiconductors, Fermi level in a semiconductor and its variation with temperature and charge carrier concentration, drift and diffusion, conductivity of a semiconductor, carrier lifetime, the continuity equation, the Hall effect.

Formation of PN junction, open circuit PN junction, energy band diagram of PN diode, derivation of diode equation, I-V characteristics of PN junction diode and temperature dependence, diode resistance, Zener diode, LED and photo diode.

IV - Transistors

Bipolar junction transistor (BJT), transistor current components, the transistor as an amplifier, transistor construction, detailed study of the currents in a transistor, the transistor alpha, beta and gamma, the common-base configuration, the common-emitter configuration, the common-collector configuration.

The junction field-effect transistor (JFET), the JFET volt-ampere characteristics, the insulated-gate FET (MOSFET): The enhancement MOSFET, the depletion MOSFET, UJT construction and characteristics.

Unit V - Nanomaterials

Origin of nanotechnology, general definition of nanomaterials, surface to volume ratio, quantum confinement. Classification of nanomaterials: quantum dots (0-dimension), quantum wire (1-dimension) and quantum well (2-dimension). Density of states for 0, 1 and 2-dimensions (qualitative). Synthesis of nanomaterials: top down- Ball milling, Physical vapor deposition (thermal evaporation, PLD); Bottom up- Sol-gel method, Chemical vapor deposition. Characterization: XRD, optical microscope, SEM and TEM. Applications of nanomaterials.

and

Course Outcomes: On completing the course a student would be able to understand

CO 1 : The concepts involving the physics of lasers, lasing action, construction and working of He-Ne laser, semiconductor laser and propagation of light through optical fibers.

CO 2 : Schrodinger wave equation and its application, free electron models, formation of bands in solids and electron occupation in bands.

CO 3 : Estimation of charge carrier concentration in semiconductors and understand the formation of pn junction, construction and characteristics of different diodes like rectifying, Zener & Tunnel diodes.

CO 4 : Transistor current components, characteristics of CB, CE and CC configurations, also understand the construction, working and characteristics of JFET & MOSFET.

CO 5 : The principles of nanotechnology, types of nanomaterials, synthesis: Top-down and bottom-up methods, characterization: XRD, SEM & TEM.

Text Books:

1. Engineering Physics, Hitendra K Malik and A K Singh, McGraw-Hill Publications, 2017.
2. Electronic Devices and Circuits, Milliman and Halkias, 4th Edition, McGraw-Hill Publications, 2015.

References:

1. Introduction to Solid State Physics, C. Kittel, 8th Edition, Wiley India, 2012.
2. Semiconductor Physics and Devices, Donald A. Neamen, 4th Edition, McGraw-Hill Publications, 2012.

MATHEMATICS-II

(Common to All branches)

Instruction	:	3 Periods/week	Sessional Marks	: 30
Tutorial	:	-	End Examination Marks	: 70
Credits	:	3	End Exam Duration	: 3 Hours

Course Objectives :

1. To study the first order Ordinary Differential Equations (O.D.E) and acquire the skill of finding analytical solutions of such equations.
2. To study the higher order O.D.E and acquire the skill of finding analytical solutions of such equations.
3. To evaluate double and triple integrals and study their applications.
4. To acquire the knowledge of differentiation and integration in scalar and vector fields and study their applications
5. To acquire the knowledge of the Partial Differential Equations (P.D.E) of first order and the skill of finding analytical solutions of such equations.

Unit I - First Order O.D.E

Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit II - Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $\sin ax, \cos ax, e^{ax}$, polynomials in x, $e^{ax}V(x)$ and $xV(x)$; method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Legendre's equation, Cauchy-Euler equation.

Unit III - Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates); Change of order of integration (only Cartesian form); Change of variables (Cartesian to polar coordinates) ;Evaluation of Triple Integrals: Change of variables (Cartesian to Spherical and Cylindrical polar coordinates).

Applications: Areas and Volumes, Centre of Mass and Gravity (constant and variable densities); Applications involving cubes, sphere and rectangular parallelepipeds.

Unit IV - Vector Calculus

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational Vectors. Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Unit V - Partial Differential Equations

Formation of partial differential equations by eliminating arbitrary constants or arbitrary functions. Solutions of first order linear (Lagrange) equations by Method of grouping and Multipliers. Solution of nonlinear first order equations (four standard types). Charpit's method .

Course Outcomes : At the end of the course, the student will be able to

CO 1 : Solve the first order O.D.E and appreciate their applications

CO 2 : Solve higher order O.D.E and appreciate their applications in engineering problems

CO 3 : Evaluate double and triple integrals and apply them in engineering problems

CO 4 : Evaluate the line, surface and volume integrals and converting them from one to another

CO 5 : Solve first order linear and non-linear P.D.E

Text Books :

1. Advanced Engineering Mathematics, R.K. Jain and S.R.K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, B.V.Ramana, 11th Reprint, Tata McGraw-Hill New Delhi, 2010.

References :

1. Calculus and Analytical Geometry, G.B.Thomas and R.L.Finney, Pearson Publishers.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley Publishers.
4. Advanced Engineering Mathematics, Michael Greenberg, Pearson Publishers.

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COMPUTATIONAL MATHEMATICS

(Common to All branches)

Instruction	:	2 Periods/week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	2	End Exam Duration	:	3 Hours

Course Objectives :

1. To understand the distinction between analytical and approximate solutions of certain problems. To find approximate solutions of Algebraic and Transcendental equations.
2. To obtain an approximating interpolating polynomial for a given set of data points of an unknown function .
3. To fit a suitable curve, to evaluate derivatives and integrals numerically for a given data.
4. To learn the numerical solutions of first order initial value problems in O.D.E.
5. To obtain finite difference solutions of certain P.D.E.

Unit I - Solutions of Algebraic and Transcendental Equations

Introduction - Bisection method, Method of false position, Iteration method and Newton-Raphson method.

Unit II - Interpolation

Finite differences – Forward, Backward differences- Newton's forward and backward difference formulas, Newton's Divided Differences, Lagrange interpolation for unevenly spaced data.

Unit III - Curve fitting, Numerical Differentiation and Numerical Integration

Curve fitting: Fitting a first degree (linear) and second degree (parabola), exponential, power curves for a data by the Method of least squares. Numerical differentiation, Numerical integration: Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules.

Unit IV - Numerical solutions of Initial Value Problems in O.D.E

Picard's method of successive approximation - Solution by Taylor series method - Euler method, Modified Euler method and Runge-Kutta methods of second and fourth orders.

Unit V - Numerical solutions to P.D.E

Classification of P.D.E- Finite difference solution to two-dimensional Laplace equation and Poisson equation; Implicit and Explicit methods for one-dimensional Heat equation(Bender-Schmidt and Crank-Nicholson methods).

Course Outcomes : At the end of the course, the student will be able to

CO 1 : Find the real roots of Algebraic and Transcendental equations.
CO 2 : Understand interpolation and obtain approximate solutions for evenly and unevenly spaced data.
CO 3 : Fit a given data to a linear/non-linear curve and appreciate the concepts of numerical differentiation and integration.
CO 4 : Develop the skill of finding approximate solutions to problems arising in first order initial value problems in differential equations.
CO 5 : Find finite difference solutions of certain P.D.E.

Text Books :

1. Numerical Methods in Engineering and Science (With Programs in Fortran 77, C and C++) B.S.Grewal, Khanna Publications.
2. Numerical methods, V.N.Vedamurthy and N.Ch.S.N. Iyengar, Vikas Publishing House Pvt. Ltd.

References :

1. Numerical Methods, P.Kandasamy, K.Thilagavathy & K.Gunavathi, S.Chand & Company.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley Publishers.
3. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Narosa Publishing House.
4. Numerical methods, S.Arumugam, A.Thangapandi Isaac and A. Soma Sundaram, Scitech Publications (India) Pvt. Ltd.

DATA STRUCTURES THROUGH 'C'

Instruction	:	3 Periods / week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives:

1. To introduce and impart knowledge to the student on the concepts of Abstract data Type, data structure, performance measurement, time and space complexities of algorithms.
2. To enable understanding of the student, towards a real-world problem solving involving representation of data or physical entities in the program, processing them through a well-defined set of operations while giving persistence.
3. To enable the student apply appropriate data structures to solve a complex problem.
4. To enable the student analyze the solutions available for a problem, model, design and implement the best algorithm for an application development.

Unit I – User Defined Data types

Lists: Introduction to linear, non-linear data structures, What is a List, Operations on a List, List Implementation using Arrays and Linked Lists.
Searching: Linear Search, Binary Search
Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort Algorithms.

Unit II – Stacks & Queues

Stacks: Stack ADT, Implementation of Stacks using Arrays and Linked lists. Applications of Stacks – infix to postfix, postfix evaluation of expressions implementation
Queues: Queue ADT, Implementation of Queues using Arrays and Linked Lists.

Unit III – Trees

Introduction to Trees:
Binary tree: Definition, Types of Binary Trees, Properties of Binary Trees, Binary Tree Traversals.
Binary search Tree (BST): Definition, Operations: Traversals, insertion, deletion, Search and their implementation on BST.

Unit IV – Graphs

Graphs: Definition, Applications of graphs, Graph Representation- Adjacency Matrix, Adjacency lists, Graph Traversals, Minimal Spanning Tree- Prim's Algorithm, and Kruskal's Algorithm.

Unit V – Hashing

Hashing: Introduction to Hashing, HashTable, hash function, Collision, Collision resolution techniques- Separate Chaining, Open addressing (linear probing, quadratic probing, double hashing), Rehashing and their implementation.

Course Outcomes: At the end of the course, the student should be able to

CO 1 : Understand basic concepts, Design and implement linear data structures such as linked lists, stacks, queues by using C as the programming language using static or dynamic implementations.

CO 2 : Able to understand and analyze, differentiate and implement elementary algorithms: sorting, searching and hashing and will also be able to compare and contrast algorithms with respect to time and space complexity.

CO 3 : Able to implement nonlinear data structures like trees and graphs and apply appropriate data structures to designing solutions to real world complex problems.

CO 4 : Demonstrate sound understanding of graph traversals and ability to implement various algorithms on graphs and interpret the results.

CO 5 : Ability to implement hashing techniques for storing and searching efficiently.

Text Books:

1. Data Structures: A Pseudocode Approach with C, Richard F. Gilberg, Behrouz A. Forouzan, 2nd Edition, Cengage Learning.
2. Fundamentals of Data structures in C, E. Horowitz, S. Sahni and Susan Anderson-Freed, 2nd Edition, Universities Press.

References:

1. Data Structures using C, R. Thareja, Oxford University Press.
2. Data Structures, Schaum's Outlines, S. Lipscutz, TMH.
3. Narasimha Karumanchi, Data Structures and Algorithms Made Easy, CareerMonk.