PROGRAM STRUCTURE AND SYLLABUS OF B.TECH 1st YEAR

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

R20 Regulations

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2020-2021 onwards)

ANURAG UNIVERSITY

Venkatapur (V), Ghatkesar (M),

Medchal-Malkajgiri (Dist), Telangana - 500088

www.anurag.edu.in

ANURAG UNIVERSITY
HYDERABAD

I YEAR I SEMESTER **COURSE STRUCTURE**

S.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A51001	Mathematics–I	3	1	0	4.0
2	A51002	Engineering Physics	3	1	0	4.0
3	A51003	Engineering Mechanics	3	1	0	4.0
4	A51004	Programming for Problem Solving-I	2	0	0	2.0
5	A51210	Engineering Physics Lab	0	0	3	1.5
6	A51211	Engineering Workshop	0	0	3	1.5
7	A51212	Programming for Problem Solving – I Lab	0	0	3	1.5
8	A51213	English Communication Skills Lab	0	0	2	1.0
TOTAL			**11**	**3**	**11**	**19.5**

I YEAR II SEMESTER **COURSE STRUCTURE**

S.No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
1	A52001	Mathematics–II	3	1	0	4.0
2	A52008	English	2	0	0	2.0
3	A52009	Engineering Chemistry	3	1	0	4.0
4	A52003	Programming for Problem Solving- II	2	0	0	2.0
5	A52011	Engineering Graphics	1	0	3	2.5
6	A52208	English Language Skills Lab	0	0	2	1.0
7	A52209	Engineering Chemistry Lab	0	0	3	1.5
8	A52210	Programming for Problem Solving-II Lab	0	0	3	1.5
TOTAL			**11**	**02**	**11**	**18.5**

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I Year B.Tech. AIML - I Sem.	**L**	**T**	**P**	**D**	**C**
	3	**1**	**-**	**-**	**4**

Course Code: A51001

MATHEMATICS - I
(Linear Algebra and Calculus)

Course Objectives: To learn

1. Determine the rank of the matrix and investigate the solution of system of equations by applying the concepts of consistency.
2. Concepts of Eigen values and Eigen vectors and the nature of quadratic form by finding Eigen values.
3. Concepts of sequence and series and identifying their nature by applying some tests.
4. Mean value theorems geometrical interpretation and their application to themathematical problems, evaluation of improper integrals using Beta and Gamma functions
5. Partial differentiation, total derivative and finding maxima minima of functions of several variables.

Course Outcomes: After learning the contents of this paper the students must able to:

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyse the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extrima of functions of two variables with/ without constraints.

UNIT-I: Matrices and Linear System of Equations

Real matrices: Symmetric, skew - symmetric, orthogonal, Linear and Orthogonal Transformation. Complex matrices: Hermitian, Skew – Hermitian and Unitary. Elementary row transformations-Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods (Gauss Elimination).

UNIT-II: Eigen Values and Eigen Vectors

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonolization of a matrix- Quadratic forms: Nature, Index, Signature.

UNIT-III: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.

Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Cauchy's root test; Raabe's test; Cauchy's Integral test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Beta & Gamma Functions and Calculus

Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates). Improper Integrals and their properties, Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems.

UNIT-V: Multi Variable Calculus

PartialDifferentiation and total differentiation, Functional dependence, Jacobian Determinant-Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

REFERENCES:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. Bernard Kolman and David R. Hill Introductory Linear Algebra: An Applied First Course, 8th Edition, Pearson.

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	3	1	-	-	4

Course Code:

ENGINEERING PHYSICS

Course Outcomes: After completion of this course the student is able to

1. Understand the basics of mechanical and electrical oscillators.
2. Learn the importance of interference pattern in thin films, diffraction and resolution.
3. Distinguish principle, working of various laser systems and light propagation through optical fibers.
4. Examine various crystal systems and crystal structures through X-ray diffraction.
5. Learn various magnetic and dielectric properties of materials for engineering applications.

UNIT-I: Oscillations and Waves

Simple harmonic motion and its characteristics, torsional pendulum, damped harmonic oscillations, wave equation for heavy, critical and light damping, logarithmic decrement, energy decay in a damped harmonic oscillator, power dissipation, quality factor, electrical analogy for a damped harmonic oscillator, forced oscillations, equation of motion of forced vibrations, resonance.

Waves: Equation of motion of transverse wave, reflection and transmission at a boundary, stationary waves.

UNIT-II: Wave Optics

Introduction, superposition of waves, coherence, Young's double slit experiment (qualitative), interference in thin film by reflection, Newton's rings.

Diffraction: introduction, Fraunhofer diffraction at single slit, double slit diffraction (qualitative), multiple slit diffraction (qualitative) and its resolving power.

Polarization: Introduction, polarization by reflection, Nicol's prism and its applications.

UNIT-III: Fiber Optics and Lasers

Fiber Optics: Introduction, principle of optical fiber, numerical aperture, types of optical fibers, losses in optical fibers, optical fiber communication system, applications of optical fibers.

Lasers: Introduction, characteristics of a laser, Einstein's coefficients, population inversion, pumping methods, Nd: YAG laser, He-Ne laser, Semiconductor laser, applications.

Unit-IV: Crystal Structures and X-ray Diffraction

Introduction, space lattice, unit cell, Bravais lattices, crystal systems, coordination number, structures and atomic packing fractions of simple cubic, body centered cubic, face centered cubic crystals.

Crystal planes and directions, Miller indices for crystal planes, inter planar spacing of orthogonal crystal systems, Bragg's law, Debye-Scherrer powder diffraction method, applications of XRD.

UNIT-V: Magnetic and Dielectric Materials

Magnetic Materials: Introduction, origin of magnetic moments, classification of magnetic materials, domain theory of ferromagnetism, hysteresis curve, soft and hard magnetic materials.

Dielectric Materials: Introduction, frequency and temperature dependence of dielectric constant, types of polarization in dielectrics, internal fields, Clausius–Mossotti equation, ferroelectricity and piezoelectricity and their applications.

Text books:

1. M N Avadhanulu, A Text book of Engineering Physics, P G Kshirsagar; S Chand, 2018 Edition.
2. B K Pandey and S Chaturvedi, Engineering Physics, CENGAGE Learning, 2013 Edition.
3. D K Bhattacharya and Poonam Tandon; Engineering Physics, OXFORD University Press, 2015 Edition.

Reference books:

1. Ian G. Main, Oscillations and waves in physics, 3rd Edition.
2. H.J. Pain, The physics of vibrations and waves, 6th Edition.
3. A. Ghatak, Optics (2017)
4. O. Svelto, Principles of Lasers, fifth edition, 2010.
5. P K Palanisamy, Engineering Physics, Scietech publication, fourth edition.
6. Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, eight edition.
7. M Armugam; Solid State Physics, Anuradha Publications, 2009.
8. Puri and Bubber , Solid state Physics, 2010.

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I Year B.Tech. AIML – I Sem.	L	T	P	D	C
	2	-	-	-	2

Course Code: A51004

PROGRAMMING FOR PROBLEM SOLVING-I

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

CO. 1 Design algorithms and flowcharts for real world applications using 'C'

CO. 2 Know the usage of various operators in Program development

CO. 3 Design programs involving decision and iteration structures.

CO. 4 Apply the concepts code reusability using Functions

CO. 5 Analyze the concepts of Arrays and Strings for real world problems.

UNIT - I

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and Pseudo code.
Overview of C Language: Introduction, Salient Features of C Language, Structure of a "C" Program.
C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input & Output Statements with suitable illustrative "C" Programs.

UNIT-II

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative "C" Programs.

UNIT-III

Statements in C:
Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative "C" Programs.
Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs.

UNIT-1V

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return vsexit( ),Parameter Passing mechanisms, Call-by-Value, Recursion, Storage Classes

UNIT-V

Arrays: Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions

Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions
(strlen( ), strcmp( ), strcat( ),strcpy( ), and strrev( ))

Text Books:

1. B.A.Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", 3rd Edition, CENGAGE Learning, 2016
2. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2011.

Reference Books:

1. Byron Gottfried, "Programming with C ", Schaum's Outlines, 2nd Edition, TATA McGraw-Hill.
2. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition, 2009.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

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	L	T	P	D	C
I Year B.Tech. AIML – I Sem.	**3**	**1**	**-**	**-**	**4**

Course Code:

ENGINEERING MECHANICS

Course Objectives: The objectives of this course are to

1. Enable the students to do the analysis of static objects by the concepts of force, moment and mechanical equilibrium.
2. Develop the student's knowledge to solve various problems on friction.
3. Enable the students to find the centroid and center of gravity of a given section.
4. Develop the students knowledge to determine the area and mass moment of inertia of given section.
5. Enable the students to formulate a problem given from work-energy Principle.

COURSE OUTCOMES:

After completion of the course, the students would be able to

1. Solve the resultant of forces which are acting on the systems and also able to apply the equilibrium conditions on a body.
2. Solve the problems based on friction.
3. Calculate the centroid and centre of gravity of composite sections.
4. Solve the area and mass moment of inertia of simple and composite sections.
5. Calculate the distance travelled and time required for the particle in case of connected systems.

UNIT - I:

Introduction to Engineering Mechanics: Basic concepts.

System of Forces: Coplanar, Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System.

Equilibrium of System of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems, Lame's Theorem.

UNIT – II:

Friction: Basic concepts, Types of Friction, Laws of Friction, Static and Dynamic Friction, Motion of Bodies, Wedge friction, ladder Friction, screw friction, applications.

UNIT - III:

Centroid: Centroids of simple figures (from basic principles) Centroids of Composite Figures.

Centre of Gravity: CG of simple bodies (from basic principles), CG of composite bodies, Pappus theorem.

UNIT- IV:

Area Moment of Inertia: Definition - Polar Moment of Inertia, Transfer Theorem, MI of Composite Figures, Product of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: MI of Masses, Transfer Formula for MMI, MMI of composite bodies.

UNIT - V:

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion. Connected System-Fixed Axis Rotation and Plane Motion.Impulse momentum method.

TEXT BOOKS:

1. K.Vijaya Kumar Reddy and J.SureshKumar, Singer‟s Engineering Mechanics.
2. S.S.Bhavikatti and J.G.Rajasekharappa, Engineering Mechanics.
3. Timoshenko &Young, Engineering Mechanics.

REFERENCE BOOKS:

1. Meriam and Kraize, Engineering Mechanics.
2. K.L.Kumar, Engineering Mechanics, Tata McGrawHill.
3. A. K.Tayal, Engineering Mechanics.

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I Year B.Tech. AIML - I	L	T	P	D	C
	0	-	3	-	1.5

Sem. Course Code:

ENGINEERING PHYSICS LAB

Course Outcomes:

1. Learn the principles of interference, diffraction and dispersion of light
2. Realize the importance of I-V characteristics of P-N diode, LED, LASER and solar cell.
3. Know the basic principles of optical fiber and laser.
4. Learn the electrical, mechanical and magnetic properties of materials.
5. Learn the mechanical waves undergo interference phenomena.

List of Experiments:

1. Determination of Rigidity Modulus of a Material – Torsional Pendulum
2. Study of Resonance in LCR – Series circuit
3. Determination of frequency of vibrating tuning fork - Melde's Experiment
4. Dispersive Power of the Material of a Prism – Spectrometer
5. Newton's Rings – Determination of Radius of Curvature of Lens
6. Diffraction Grating – Determination of Wavelength of a Monochromatic Source
7. Single Slit Diffraction using Lasers – Determination of Slit Width
8. Evaluation of Numerical Aperture & Bending losses of an Optical Fiber
9. Stewart & Gees Method – Magnetic field along the axis of a Coil
10. Measurement of Dielectric constant

Reference books:

1 A.C. Melissios, Experiments in Modern Physics, Academic Press, N.Y.2003, 2nd Edition.

2 C. Kittel, Introduction to Solid State Physics, Wiley Eastern Limited, 5th Edition.

3. Indu Prakash/Ram Krishna/A.K. Jha, A text book of Practical Physics, 3rd Edition.

4. A.K. Katiyar, Engineering Physics: Theory and Practical, 2015.

5. Fison Alfred Henry, Notes on Practical Physics, 2009.

6. H.P. Shrivastava ,Textbook of Practical Physics, 2008.

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I Year B.Tech. AIML – I Sem.

	L	T	P	D	C
Course Code:	**0**	**-**	**3**	**-**	**1.5**

PROGRAMMING FOR PROBLEM SOLVING – I LAB

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

CO 1: Apply the specification of syntax rules for numerical constants and variables, data types

CO 2: Know the Usage of various operators and other C constructs

CO 3: Design programs on decision and control constructs

CO 4: Develop programs on code reusability using functions

CO 5: Implement various concepts of arrays and strings

Week 1:
Ubuntu and Linux Commands

Week 2:
Designing of flowcharts and algorithms using raptor tool

1. Areas of Polygons
2. Calculation of Simple and Compound Interest
3. Swapping of Two numbers with and without temporary variable
4. Checking whether a number is even or odd
5. Sum of first ‘n’ natural numbers
6. Checking a number whether it is divisible by any given number
7. Evaluation of mathematical expressions.
8. Programs using scanf( ) and printf( ) statements.

Week 3:
Programs on operators

Week 4,5&6:
Programs Conditional Statements

Week 7-9:
Programs on Control Statements

Week 10&11:
Programs on Functions

Week 12:
Programs on One Dimensional Arrays

Week 13:
Programs on Two Dimensional Arrays

Week 14 &15
Implementation of string functions with and without built-in functions

Week 16:
Review

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I Year B.Tech. AIML - I Sem.	L	T	P	D	C
	0	-	3	-	1.5

Course Code:

ENGINEERING WORKSHOP

Course Objectives:

To Study of different hand operated power tools, uses and their demonstration.

1. To gain a good basic working knowledge required for the production of various engineering products.
2. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
3. To develop a right attitude, team working, precision and safety at workplace.
4. It explains the construction, function, use and application of different working tools, equipment and machines.
5. To study commonly used carpentry joints.
6. To have practical exposure to various welding and joining processes.
7. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

COURSE OUTCOMES:

At the end of the course, the student will be able to

1. Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
2. Apply basic electrical engineering knowledge for house wiring practice.
3. Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring and chiseling.
4. Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Moulding and their operations

1. TRADES FOR EXERCISES: At least two exercises from eachtrade:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)

II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)

III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)

IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)

V. Welding Practice – (Arc Welding & Gas Welding)

VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)

VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

VIII. Glass Cutting.

2. TRADES FOR DEMONSTRATION &EXPOSURE:

Plumbing, Machine Shop, Power tools used in Construction and Wood Working and Plastic Molding

Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering andTechnology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th Edition, Prentice Hall India, 1998.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.

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I Year B.Tech. AIML – I Sem.	L	T	P	D	C
Course Code:	0	-	2	-	1

ENGLISH COMMUNICATION SKILLS LAB

Exercise-I

ICS Lab:

The 4 secrets of successful Communication

Spoken vs. Written language- Formal and Informal English- Elevator speech-Introducing Others

Ice-Breaking activities and JAM sessions

Exercise-II

ICS Lab:

Features of Good Conversation

Common Everyday Situations: Conversations and Dialogues

Role-Plays- Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making suggestions etc.

Exercise-III

ICS Lab:

Communication at Workplace, Social and Professional Etiquette

Descriptions(Person,place,object)- Narrations- Giving Directions and Guidelines

Telephone Etiquette

Exercise-IV

ICS Lab:

Formal Presentations

Public Speaking – Exposure to Structured Talks - Non-verbal Communication-

Exercise-V

ICS Lab:

Extempore speeches

Debates

Text Books:

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Krishna Mohan and N. P. Singh, Speaking English Effectively, 2nd Edition 2011, Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V., How to Prepare for Group Discussion and Interviews, Tata McGraw Hill.
4. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
5. R. K. Bansal & J. B. Harrison, Spoken English: A Manual of Speech and Phonetics, 2013. Orient Blackswan. Hyderabad.
6. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
7. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
8. T. Balasubramanian, A textbook of English Phonetics for Indian Students (Macmillan)

Lab Manual: A Manual entitled "English Language Communication Skills (ELCS) Lab Manual- cum- Work Book", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

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I Year B.Tech. AIML – II Sem.	**L**	**T**	**P**	**D**	**C**
	3	**1**	**-**	**-**	**4**

Course Code: A52001

MATHEMATICS-II

(ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS)

Course Objectives: To learn

1. Methods of solving the differential equations of first and higher orders.
2. Evaluation of multiple integrals.
3. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes: After learning the contents of this paper the students must be able to:

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
3. Evaluate the Double and Triple integrals.
4. Identify the vector differential operators physically in engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

UNIT-I: Differential Equations of first order and their Applications

Formation of Differential equations, differential equations of first order and first degree: exact, linear and Bernoulli, applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II: Higher Order Linear Differential Equations

Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) $= e^{ax}, \sin ax, \cos ax \text{ and } x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters. Equations reducible to linear ODE with constant coefficients: Cauchy-Euler equation, Legendre's equation.

UNIT-III: Multiple Integrals

Multiple integrals - double and triple integrals – change of order of integration (Only Cartesian form)- change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Applications of Double integrals and Triple integrals.

UNIT-IV: Vector Differentiation

Scalar and Vector point functions, Gradient, Divergence, Curl and their related properties – Directional Derivatives, Solenoidal and Irrotational vectors, Scalar potential function.

UNIT-V: Vector Integration

Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements) - Problems based on these theorems.

TEXTBOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

REFERENCES:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. Dennis G Zill and Michael R Cullen, Advanced Engineering Mathematics 3rd Edition, Jones & Bartlett Learning, 2006 - Technology & Engineering.
4. S. L., Ross, Differential Equations, 3rd Edition, Wiley India, 2009.
5. George Simmons, Differential Equations with Applications and Historical Notes, McGraw Hill Education; 2 edition, 2017.

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I Year B.Tech. AIML – II	L	T	P	D	C
Sem. Course Code:	2	-	-	-	2

ENGLISH

Course Objectives:

The course will help to

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
3. Develop study skills and communication skills in formal and informal situations.

Course Outcomes:

The students will be able to

1. Understand the application of language skills in promoting the responsibilities towards society.
2. Use appropriate and Standard Language with basic grammatical concepts both for Technical and Professional purpose.
3. Use General and Technical Vocabulary in different academic situations.
4. Apply the Subject and Theme in establishing and spreading Human Values in the society.
5. Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.

UNIT –I

'The Raman Effect' from the prescribed textbook **'English for Engineers'** published by **Cambridge University Press**.

Vocabulary Building: The Concept of Word Formation --The use of Prefixes andSuffixes.

Grammar: Identifying Common Errors in Writing with reference to Articles and Prepositions.

Reading: Reading and its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures –Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** –Organizing Principles of Paragraphs in Documents.

UNIT –II

'Ancient Architecture in India' from the prescribed textbook **'English for Engineers'** published by **Cambridge University Press.**

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-Pronoun Agreement and Subject-Verb Agreement.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension

Writing: Format of a Formal Letter- Writing Formal Letters Eg.Letter ofComplaint, Letter of Requisition.

UNIT –III

'Blue Jeans' from the prescribed textbook '**English for Engineers'** published by **Cambridge University Press.**

Vocabulary: Acquaintance with Prefixes and Suffixes from foreign languages in English to form Derivatives-Words from foreign languages and their use in English.

Grammar: Misplaced Modifiers and Tenses.

Reading: Sub-skills of Reading- Skimming and Scanning

Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

UNIT –IV

'What Should You Be Eating' from the prescribed textbook '**English for Engineers'** published by **Cambridge University Press.**

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in oral and written communication.

Reading: Intensive Reading and Extensive Reading

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing- Précis Writing.

UNIT –V

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook **'English for Engineers'** published by **Cambridge University Press**.

Vocabulary: Technical Vocabulary and its usage

Grammar: Common Errors in English

Reading: Reading Comprehension-exercises for practice

Writing: Technical Reports- Introduction – characteristics of a Report – categories of Report Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

TEXTBOOK:

1. Sudarshana, N.P. and Savitha, C. (2018), English for Engineers, Cambridge University Press.

REFERENCES:

1. Green, David. Contemporary English Grammar –Structures and Composition, MacMillan India, 2014 (Print)
2. Rizvi, M. Ashraf. Effective Technical Communication, Tata Mc Graw –Hill, 2015 (Print)
3. Raman, Meenakshi and Sharma, Sangeeta "Technical Communication- Principles and Practice", 3rd Edition, New Delhi: Oxford University Press, 2015, Print.
4. Michael Swan, Practical English Usage, OUP, 1995.
5. F.T. Wood, Remedial English Grammar, Macmillan, 2007
6. William Zinsser, On Writing Well, Harper Resource Book, 2001
7. Liz Hamp-Lyons and Ben Heasly, Study Writing, Cambridge University Press, 2006.
8. Sanjay Kumar and PushpLata, Communication Skills, Oxford University Press, 2011.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad, Oxford University Press.

ANURAG UNIVERSITY
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I Year B.Tech. AIML – II Sem.

L	T	P	D	C
3	1	-	-	4

Course Code:

ENGINEERING CHEMISTRY

Course Objectives:

- To bring adaptability to the concepts of Chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment, as it is essential for the engineers and for the industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical and other fields.
- To impart the knowledge of stereochemistry and synthetic aspects useful for Understanding reaction pathways

Course Outcomes:

The course will enable the student to:

- Distinguish the ranges of electromagnetic radiations used for exciting different energy levels in various spectroscopic techniques.
- Apply the knowledge of electrode potentials for the protection of metals from corrosion.
- Analyze the troubles caused by impure water and method of purification of water.
- Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
- Apply the concept of engineering materials and biodegradable polymers in medicine and other fields.

UNIT I

Molecular structure and Spectroscopy

Introduction, Concept of atomic and molecular orbitals, LCAO, molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of diatomic molecules (N_2, O_2 and F_2). Pi-molecular orbitals of butadiene and benzene.

Spectroscopic techniques:

Principles of spectroscopy, selection rules and applications of electronic spectroscopy (UV & Visible). Vibrational and rotational spectroscopy (IR spectroscopy) - Applications.

UNIT II

Water Technology

Causes and effects of hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness.Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler feed water: Boiler troubles (scale and sludge, priming, foaming, caustic embrittlement and boiler corrosion) and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (lime-soda and ion –exchange processes).

UNIT III

Electrochemistry and corrosion

Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Normal Hydrogen Electrode, calomel electrode),Determination of pH.Nernst equation, Numerical problems.

BATTERIES: Introduction to cell and battery, Primary (lithium cell) and secondary cells, (lead-Acid cell, and Lithium ion cells). Fuel cells – Hydrogen – Oxygen fuel cell, advantages and engineering applications of fuel cells. Introduction to super capacitors.

Corrosion: Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: nature of the metal, galvanic series, Anodic index, purity of metal, nature of corrosion product, nature of environment: effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings: metallic coatings (anodic and cathodic), methods of applications of metallic coatings: electroplating (of copper), electroless plating (of Ni).

UNIT IV

Stereochemistry, Reaction mechanism and synthesis of drug molecules

Structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity. Conformational analysis of n-butane.

Organic reactions and synthesis of drug molecules

Introduction to reactions involving substitution (S_N1 & S_N2), addition (addition of HBr to propene, Markownikoff and Anti Markownikoff addition), Elimination reactions: dehydrohalogenation of alkyl halides. Saytzeff rule.Redox reactions (oxidation of alcohols using $KMnO_4$& CrO_3, reduction of carbonyl compounds by $LiAlH_4$& $NaBH_4$). Synthesis & uses of drug molecules: Paracetamol and Aspirin.

UNIT V

Advanced Engineering Materials

Biodegradable polymers:

Concept, preperation, properties and applications of Polyhydroxy Butyrate (PHB) Poly-Hydroxybutyrate-co-β-Hydroxyvalerate (PHBV), Polyglycolic acid (PGA), Polylactic acid (PLA), Poly (Î-caprolactone) (PCL).

Lubricants: Introduction, classification with examples, characteristics of a good lubricant and properties of lubricants: Viscosity and viscosity index, cloud point, pour point, flash & fire point.

Refractories: Classification with examples, characteristics and properties (Refractoriness, RUL & thermal spalling).

Ceramics- Introduction, chemical bonding and applications.

Text Books:

1. P.C Jain & Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, 6th Edition, 2013.
2. Shashi chawla, Engineering Chemistry, Dhanpat Rai Publishing Company, 2013.

Reference Books:

1. P. W. Atkins, Physical Chemistry, Oxford University press, 9th Edition, 2010.
2. A. Jayashree, Text book of Engineering Chemistry, Wiley Publications, 1st Edition, 2018.
3. C.N.Banwell, Principles of molecular spectroscopy, Mc Graw Hills, 4th Edition, 2001.
4. J.D.Lee, Text book of Inorganic Chemistry, Blackwell Science Ltd. 5th Edition, 2008.

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I Year B.Tech. AIML – II Sem.	L	T	P	D	C
	2	-	-	-	2

Course Code: A52003

PROGRAMMING FOR PROBLEM SOLVING-II

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

CO. 1 Develop programs with user defined data types.

CO. 2 Use dynamic memory allocation functions with pointers.

CO. 3 Apply various file handling techniques for better data management

CO. 4 Distinguish between stacks and queues.

CO. 5 Analyze various dynamic data structures.

UNIT -I

Structures: Definition and Initialization of Structures, Accessing structure members,Nested Structures, Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types.

UNIT-II

Pointers: Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointers to Structures, Pointers and Strings, Function - Call by Reference, Pointers to Pointers, Dynamic Memory Allocation.

UNIT III:

Files : Input and Output – Concept of a file,streams, text files and binary files,Differences between text and binaryfiles,State of a file, Opening and Closingfiles, file input / output functions(standard library input / output functions for files), file status functions (errorhandling),Positioning functions,command –line arguments, C programexamples.

UNIT-IV:

Introduction to Data Structures: Lists and Operations, Linear and Non linear Data structures

Stacks-Introduction to Stacks, Operations , Implementation of Stack using Arrays

Queues- Introduction to Queues, Operations, Implementation of Queues using Arrays

UNIT-V

Linked Lists:Introduction to Linked List, Operations on Single Linked List(search, Insertion &Deletion)Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort and Quick sort.

Text Books:

1. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016
2. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2011.

Reference Books:

1. Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2. M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

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I Year B.Tech. AIML – II Sem.	L	T	P	D	C
Course Code:	0	-	2	-	1

ENGLISH LANGUAGE SKILLS LAB

Exercise-I

CALL Lab:

Introduction to Phonetics - Speech Sounds

Vowels and Consonants-Listening Comprehension

Common Indian Variants in Pronunciation – Differences between British and American Pronunciation

Exercise-II

CALL Lab:

Pronunciation, Common Errors in Pronunciation, Neutralization of Mother Tongue Influence

Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening

Exercise-III

CALL Lab:

Syllables -Consonant Clusters

Sentence Stress -Weak Forms and Strong Forms

Exercise-IV

CALL Lab:

Word accent and Stress Shifts

Past Tense Marker and Plural Marker

Exercise-V

CALL Lab:

Intonation, Stress and Rhythm

Data Interpretation

Text Books:

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. Krishna Mohan and N. P. Singh, Speaking English Effectively 2nd Edition, 2011, Macmillan Publishers India Ltd. Delhi.
3. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews, Tata McGraw Hill.
4. Hancock, M., English Pronunciation in Use. Intermediate. Cambridge: CUP, 2009.
5. R. K. Bansal & J. B. Harrison, Spoken English: A Manual of Speech and Phonetics, Orient Blackswan, Hyderabad, 2013.
6. Hewings, M., English Pronunciation in Use. Advanced. Cambridge: CUP, 2009.
7. Marks, J., English Pronunciation in Use. Elementary. Cambridge: CUP, 2009.
8. T. Balasubramanian, A textbook of English Phonetics for Indian Students, Macmillan.
9. **Lab Manual:** A Manual entitled "English Language Communication Skills (ELCS) Lab Manual- cum- Work Book", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013

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I Year B.Tech. AIML – II Sem.	L	T	P	D	C
	0	-	3	-	1.5

Course Code:

ENGINEERING CHEMISTRY LAB

Course Objectives: The student will learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Laboratory Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness, alkalinity and chloride content in water.
- Determination of physical properties like adsorption, surface tension and viscosity.
- Calculation of strength of compound using instrumentation techniques.

Choice of 10 experiments from the following:

1. Estimation of hardness of water by EDTA method
2. Determination of alkalinity of water
3. Determination of chloride content of water by argentometric analysis
4. Determination of strength of HCl and acetic acid by conductometry.
5. Potentiometric estimation of Fe^{+2} by using $KMnO_4$.
6. Determination of surface tension of soap solutions.
7. Determination of viscosity of a lubricant
8. Synthesis of paracetamol and aspirin.
9. Estimation of copper by colorimetry.
10. Adsorption of acetic acid by charcoal
11. Separation of amino acids by thin layer chromatography.
12. Determination of acid value of coconut oil.

TEXT BOOKS:

1. Vogel's, Textbook of Quantitative Chemical Analysis, Pearson Education, 6th Edition, 2000.
2. Shashi Chawla, Essentials of experimental engineering chemistry, Dhanpat Rai & Co, 2006.

REFERENCE BOOKS:

1. S.S. Dara, A text book on experiments and calculations, S Chand & Company; 9th Edition, 2015.
2. R. N. Goyal and Harrmendra Goel, Text Book of engineering chemistry, Ane Books Publishers, 2008.

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I Year B.Tech. AIML – II Sem.	L	T	P	D	C
	0	-	3	-	1.5

Course Code:

PROGRAMMING FOR PROBLEM SOLVING – II LAB

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

CO 1: Develop applications on user defined data types

CO 2: Apply dynamic memory allocation through pointers

CO3: Use different data structures for create/update basic data files

CO 4: Implement linear data structures through stacks and queues

CO 5: Implement various searching and sorting techniques, Linked lists.

Week 1:
Overview of Arrays and Functions

Week 2:
Programs on Accessing Structures, and Nested Structures

Week 3:
Array of Structures, Structures and Functions

Week 4:
Unions, typedef and enum

Week 5 &6:
Programs on pointers with its implementation, pointer arithmetic, pointer expression and Single Dimensional and Two dimensional array programs.

Week 7:
Pointer to structures, Programs on Call by Value and Reference, Pointers to Pointers

Week 8:
Programs on Dynamic Memory Allocation Functions.

Week 9 &10:
Programs on File Operations

Week 11:
Programs on Stacks and Queues Using Arrays

Week 12:
Single Linked List Programs

Week 13:
Programs on Searching Techniques

Week 14 & 15:
Programs on Sorting Techniques

Week 16:
Review