ప్రాచీన తెలుగు కవిత్వం

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రచయితలు

డా॥ బి. అశోక్

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విజయోస్తు

మమ్మీ అన్న మాటలో మమకారం కన్న
అమ్మ! అన్న మాటలో మాధుర్యం మిన్న
అమ్మ నుండి అలవడే అమృత భాష
ఆత్మీయతను పెంచే ఆంధ్ర భాష

మాధుర్యాన్ని పెంచే మాన్యభాష
రాగసుధలను రంగరించే రాష్ట్ర భాష
మమకారాన్ని పంచే మాతృభాష
తేనెలొలుకు భాష మన తెలుగు భాష

తెలుగు భాషను గౌరవిద్దాం
తెలుగు భాషలో మాట్లాడుదాం
తెలుగు జాతికి వన్నెతెద్దాం
ఇదే తెలుగుతల్లికి మనమిచ్చే నీరాజనాలు

– రచయితలు

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ప్రాచీన తెలుగు కవిత్వం

ఈ కోర్సు విజయవంతంగా ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. ప్రాచీన తెలుగుసాహిత్యం యొక్క ప్రాచీనతను, విశిష్టతను గుర్తిస్తారు. తెలుగు సాహిత్యంలో ఆదికవి నన్నయ కాలంనాటి భాషానంన్క్ృతులను, ఇతిహాసకాలంనాటి రాజనీతి విషయాలపట్ల పరిజ్ఞానాన్ని సంపాదించగలరు.
2. శివకవుల కాలంనాటి మతపరిస్థితులను, భాషావిశేషాలను గ్రహిస్తారు. తెలుగు సుడికారం, సామెతలు, లోకోక్తులు మొదలైన భాషాంశాల పట్ల పరిజ్ఞానాన్ని పొందగలరు.
3. తిక్కన భారతంనాటి మత, ధార్మిక పరిస్థితులను, తిక్కన కవితాశిల్పాన్ని, నాటకీయతను అవగాహన చేసుకోగలరు.
4. ఎఱ్ఱన సూక్తివైచిత్రిని, ఇతిహాస కవిత్వంలోని విభిన్న రీతులపట్ల అభిరుచిని పొందగలరు. శ్రీనాథుని కాలం నాటి కవితావిశేషాలను, మొల్ల కవితా విశిష్టతను గుర్తించగలరు.
5. తెలుగు పద్యం స్వరూప-స్వభావాలను, సాహిత్యాభిరుచిని పెంపొందించుకుంటారు. ప్రాచీన కావ్యభాషలోని వ్యాకరణాంశాలను అధ్యయనం చేయడం ద్వారా భాషాసామర్థ్యాన్ని, రచనలో మెళకువలను గ్రహించగలరు.

పాఠ్య ప్రణాళిక

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మహాభారతం - సభాపర్వం - ప్రథమాశ్వాసం - (26-57 పద్యాలు)

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యూనిట్ - IV

పలనాటి బెబ్బులి - శ్రీనాథుడు (పలనాటి వీరచరిత్ర - ద్విపద కావ్యం పుట 108 - 112 'బాలచంద్రుడు భీమంబగు సంగ్రామం బొనర్చుట.. (108)...

వెఱగంది కుంది' (112) సం. అక్కిరాజు ఉమాకాంతం ముద్రణ. వి. కె. స్వామి, బెజవాడ 1911.

యూనిట్ - V

సీతారావణ సంవాదం - మొల్ల

రామాయణము - సుందరకాండము - (40 - 87 పద్యాలు)

వ్యాకరణం

సంధులు: ఉత్వ, త్రిక, ద్రుతప్రకృతిక, నుగాగమ, ద్విరుక్తటకారాదేశ, యణాదేశ, వృద్ధి, శ్చుత్వ, జశ్త్వ, అనునాసిక సంధులు.

సమాసాలు: అవ్వయిభావ, తత్పురుష, కర్మధారయ, ద్వంద్వ, ద్విగు, బహువ్రీహి.

అలంకారాలు:

అర్థాలంకారాలు: ఉపమ, ఉత్ప్రేక్ష, రూపక, స్వభావోక్తి, అర్థాంతరవ్యాస, అతిశయోక్తి.

శబ్దాలంకారాలు: అనుప్రాస (వృత్యనుప్రాస, ఛేకానుప్రాస లాటానుప్రాస, అంత్యానుప్రాస)

ఛందస్సు

వృత్తాలు: ఉత్పలమాల, చంపకమాల, శార్దూలము, మత్తేభము;

జాతులు: కందం, ద్విపద; ఉపజాతులు: ఆటవెలది, తేటగీతి, సీసం మరియు ముత్యాలసరాలు

విషయ సూచిక

ప్రాచీన తెలుగు కవిత్వం

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A Course in
Communication and Soft Skills

As per Choice Based Credit System (CBCS)
For Degree I-Year/I-sem
Common to all Branches

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A Course in Communication and Soft Skills

Learning Outcomes

By the end of the course the learner will be able to:

- Use grammar effectively in writing and speaking.
- Demonstrate the use of good vocabulary
- Demonstrate an understating of writing skills
- Acquire ability to use Soft Skills in professional and daily life.
- Confidently use the tools of communication skills

Unit-1: Listening Skills

i. Importance of Listening
ii. Types of Listening
iii. Barriers to Listening
iv. Effective Listening

Unit-2: Speaking Skills

a. Sounds of English: Vowels and Consonants
b. Word Accent
c. Intonation

Unit-3: Grammar

a. Concord
b. Modals
c. Tenses (Present/Past/Future)
d. Articles
e. Prepositions
f. Question Tags
g. Sentence Transformation (Voice, Reported Speech & Degrees of Comparison)
h. Error Correction

Unit-4: Writing

i. Punctuation
ii. Spelling
iii. Paragraph Writing

Unit-5: Soft Skills

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A Course in Communication and Soft Skills

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Life Skill Course

Human Values and Professional Ethics

As per Choice Based Credit System (CBCS)
Common to all Branches

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Human Values and Professional Ethics

Learning Outcome

On completion of this course, the UG students will be able to:

- Understand the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
- Understand the value of harmonious relationship based on trust and respect in their life and profession
- Understand the role of a human being in ensuring harmony in society and nature.
- Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Unit-1: Introduction - Definition, Importance, Process & Classifications of Value Education

- Understanding the need, basic guidelines, content and process for Value Education
- Understanding the thought provoking issues; need for Values in our daily life
- Choices making - Choosing, Cherishing & Acting
- Classification of Value Education: understanding Personal Values, Social Values, Moral Values & Spiritual Values.

Unit-2: Harmony in the Family - Understanding Values in Human Relationships

- Understanding harmony in the Family- the basic unit of human interaction
- Understanding the set of proposals to verify the Harmony in the Family;

- Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
- Present Scenario: Differentiation (Disrespect) in relationships on the basis of body, physical facilities, or beliefs.
- Understanding the Problems faced due to differentiation in Relationships
- Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*)- from family to world family.

Unit-3: Professional Ethics in Education

- Understanding about Professional Integrity, Respect & Equality, Privacy, Building Trusting Relationships.
- Understanding the concepts; Positive cooperation, Respecting the competence of other professions.
- Understanding about Taking initiative and Promoting the culture of openness.
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Skill Development Course

Office Secretaryship

As per Choice Based Credit System (CBCS)
Common to all Branches

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Office Secretaryship

Learning Outcomes

By the successful completion of course, the student will be able to;

1. Understand the organizational hierarchy and outlines of functioning.
2. Comprehend the role of office secretaryship in a small and medium organization.
3. Acquire knowledge on office procedures and interpersonal skills.
4. Apply the skills in preparing and presenting notes, letters, statements, reports in different situations.

Unit-I: Introduction

Introduction - Organisational structure of a small and medium organization - Types of offices - Kinds of secretaries - The scope of office secretaryship.

Unit-II: Office Secretary

The role of an office secretary - Duties and responsibilities - Usage of different devices - Flowchart and office manuals - Coordinating different wings of an office/organisaton - Arranging common meetings - Operations of banking and financial services - travel and hospitality management services.

Unit-III: Office Procedures

Office procedures - Filing - Circulating files - Preparation of notes, circulars, agenda and minutes of meetings - Issue of press notes - Maintenance of files and records - Inventory, office, human resources, financial and confidential - maintaining public relations.

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Differential Equations

As per Choice Based Credit System (CBCS)

I - B.Sc(Mathematics) / I - Semester

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Differential Equations

Course Outcomes

After successful completion of this course, the student will be able to;

1. Solve linear differential equations
2. Convert non exact homogeneous equations to exact differential equations by using integrating factors.
3. Know the methods of finding solutions of differential equations of the first order but not of the first degree.
4. Solve higher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
5. Understand the concept and apply appropriate methods for solving differential equations.

Unit-I: Differential Equations of first order and first degree

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

Unit-II: Orthoginal Trajectories Differential Equations of first order but not of the first degree

Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Equations homogeneous in x and y; Equations of the first degree in x and y – Clairaut's Equation.

Unit-III: Higher order linear differential equations-I

Solution of homogeneous linear differential equations of order n with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators. General Solution of f(D)y = 0.

General Solution of f(D)y = Q when Q is a function of $x, \frac{1}{f(D)}$ is expressed as partial fractions.

P.I. of f(D)y = Q when $Q = be^{ax}$, P.I. of f(D)y = Q when Q is b sinax or b cos ax.

Unit-IV:Higher Order Linear Differential Equations-II

Solution of the non-homogeneous linear differential equations with constant coefficients.

P.I. of f(D) y = Q when $Q = bx^k$

P.I. of f(D) y = Q when $Q = e^{ax}V$, where V is a function of x.

P.I. of f(D) y = Q when Q = xV, where V is a function of x.

P.I. of f(D) y = Q when $Q = x^m V$, when V is a function of x.

Unit-V: Higher Order Linear Differential Equations-III

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Mechanics, Waves and Oscillations

As per Choice Based Credit System (CBCS)
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Mechanics, Waves and Oscillations

Course Outcomes

On successful completion of this course, the students will be able to:

- Understand the Newton's laws of motion and the law of conservation of linear momentum and its application to rocket motion, the concepts of concepts of impact parameter, scattering cross section and Distinguish between elastic and inelastic collisions.
- Formulate the rotational kinematic relations, learn the working principle of gyroscope and its applications and explain the precessional motion of a freely rotating symmetric top.
- Analyse the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.
- State the postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.
- Understand the phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.
- State the laws of transverse vibrations in a stretched string and their verification using a sonometer and learn the formation of harmonics and overtones in a stretched string.
- Acquire knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

Unit-I: Mechanics of Particles

Mechanics of Particles

Review of Newton's Laws of Motion, Conservation of linear momentum, Collisions, Elastic and inelastic collisions, Collisions in one and two dimension, Rocket propulsion, Impact parameter, Scattering cross-section, Rutherford scattering (No derivation-Qualitative ideas only)

Mechanics of Rigid body

Rigid body, Rotational kinematic relations, Rotational kinetic energy and moment of inertia, Angular momentum, Torque, Relation between torque and angular momentum, Conservation of angular momentum, Illustrations, Gyroscopic motion (No derivation - Qualitative ideas only), Precession of the equinoxes.

Unit-II: Central forces

Central force-Definition& examples, General Characteristics of Central forces, Conservative nature of central forces, Planetary motion-Kepler's laws (Statements & Explanation), Deduction of Newton's law of gravitation from Kepler's law, Geostationary Satellite Motion, Uses of communication satellites, Basic idea of Global Positioning System (GPS) and their applications.

Unit-III: Relativistic Mechanics

Inertial and Non-inertial reference frames-Galilean relativity; Special theory of relativity-Statements of the two basic postulates- (Elementary treatment and application only) Lorentz transformation equations (No derivations); length contraction; time dilation; addition of velocities; Einstein's mass - energy equation

Unit-IV: Undamped, Damped and Forced Oscillations

Simple harmonic motion, Characteristics of SHM, Equation of motion and solution, Combination of Simple harmonic motions along a line and perpendicular to each other-Lissajous figures& uses, Damped vibrations: Explanation and examples, Distinction between damped and undamped vibrations, Forced vibrations: Explanation and examples, Resonance, examples – Sharp resonance and Flat resonance, Sharpness of resonance, Q-factor, Volume Resonator- Determination of frequency of a given tuning fork.

Unit-V: Wave Motion

Progressive waves-Equation of a progressive wave, Velocity of transverse waves in elastic media, Standing waves, overtones and harmonics, Sonometer-Verification of laws of transverse vibrations in a stretched string, Phenomenon of beats (qualitative ideas only).

Ultrasonics

Ultrasonics, properties, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, Applications of ultrasonic waves.

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Problem Solving in 'C'

As per Choice Based Credit System (CBCS)

I - B.Sc(Computer Science) / I - Semester

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Problem Solving in 'C'

Outcomes

Upon successful completion of the course, a student will be able to:

1. Understand the evolution and functionality of a Digital Computer.
2. Apply logical skills to analyse a given problem.
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

Unit-I

General Fundamentals: Introduction to computers: Block diagram of a computer, characteristics and limitations of computers, applications of computers, types of computers, computer generations.

Introduction to Algorithms and Programming Languages: Algorithm - Key features of Algorithms, Flow Charts, Programming Languages - Generations of Programming Languages - Structured Programming Language- Design and Implementation of Correct, Efficient and Maintainable Programs.

Unit-II

Introduction to C: Introduction - Structure of C Program - Writing the first C Program - File used in C Program - Compiling and Executing C Programs - Using Comments - Keywords - Identifiers - Basic Data Types in C - Variables - Constants - I/O Statements in C - Operators in C - Programming Examples.

Decision Control and Looping Statements: Introduction to Decision Control Statements - Conditional Branching Statements - Iterative Statements - Nested Loops - Break and Continue Statement - Goto Statement

Unit-III

Arrays: Introduction - Declaration of Arrays - Accessing elements of the Array - Storing Values in Array - Operations on Arrays - one dimensional, two dimensional and multi dimensional arrays, character handling and strings.

Unit-IV

Functions: Introduction - using functions - Function declaration/ prototype - Function definition - function call - return statement - Passing parameters - Scope of variables - Storage Classes - Recursive functions.

Structure, Union, and Enumerated Data Types: Introduction - Nested Structures - Arrays of Structures - Structures and Functions - Union - Arrays of Unions Variables - Unions inside Structures - Enumerated Data Types.

Unit-V

Pointers: Understanding Computer Memory - Introduction to Pointers - declaring Pointer Variables - Pointer Expressions and Pointer Arithmetic - Null Pointers - Passing Arguments to Functions using Pointer - Pointer and Arrays - Memory Allocation in C Programs - Memory Usage - Dynamic Memory Allocation - Drawbacks of Pointers

Files: Introduction to Files - Using Files in C - Reading Data from Files - Writing Data to Files - Detecting the End-of-file - Error Handling during File Operations - Accepting Command Line Arguments.

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Problem Solving in 'C'

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ఆధునిక తెలుగు సాహిత్యం

డిగ్రీ (జనరల్) / సెమిస్టర్ - II

రచయితలు

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జనరల్ తెలుగు / సెమిస్టర్ - II

ఆధునిక తెలుగు సాహిత్యం

అభ్యసన ఫలితాలు

ఈ కోర్సు విజయవంతం ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. ఆంగ్లభాష ప్రభావం కారణంగా తెలుగులో వచ్చిన ఆధునిక సాహిత్యాన్ని, అని విశిష్టతను గుర్తిస్తారు.
2. సమకాలీన ఆధునిక సాహిత్య ప్రక్రియలైన వచన కవిత్వం, కథ, నవల, నాటకం, విమర్శ లపై అవగాహన పొందుతారు.
3. భావకవిత, అభ్యుదయ కవితలక్ష్యాలను గూర్చిన జ్ఞానాన్ని పొందుతారు. అస్తిత్వవాద ఉద్యమాలపుట్టుకను, అవశ్యకతను గుర్తిస్తారు.
4. కథాసాహిత్యం ద్వారా సామాజిక చైతన్యాన్ని పొందుతారు. సిద్ధాంతాల ద్వారా కాకుండా, వాస్తవ పరిస్థితులను తెలుసుకోవడం ద్వారా సిద్ధాంతాన్ని సమీక్షించగలరు.
5. ఆధునిక తెలుగు కల్పనాసాహిత్యం ద్వారా సామాజిక, సాంస్కృతిక, రాజకీయ చైతన్యాన్ని పొందుతారు.

పాఠ్య ప్రణాళిక

j ãÖ' { Ù I: ఆధునిక కవిత్వం

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2.	కొండవీడు	:	దువూరి రామిరెడ్డి (కవికోకిల గ్రంథావళి ఖండకావ్యాలు నక్షత్రమాల సంపుటి నుండి)
3.	మాతృసంగీతం	:	అనిసెట్టి సుబ్బారావు (అగ్నివీణ కవితాసంపుటి నుండి)
4.	తాతకో నూలుపోగు	:	బండరు ప్రసాదమూర్తి (కలనేత కవితాసంపుటి నుండి)

యూనిట్ - II: కథానిక

5.	తెలుగు కథానిక	:	పరిచయం
6.	భయం (కథ)	:	కాళీపట్నం రామరావు
7.	స్వేదం ఖరీదు....(కథ)	:	రెంటాల నాగేశ్వరరావు

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8. తెలుగు నవల : పరిచయం

9. రథచక్రాలు (నవల) : మహీధర రామ్మోహన రావు (సంక్షిప్త ఇతివత్తం మాత్రం)

10. రథచక్రాలు (సమీక్షా వ్యాసం) డా.॥యల్లాప్రగడ మల్లికార్జునరావు

యూనిట్ - IV: నాటకం

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12. యక్షగానము (నాటిక) : ఎం.వి.ఎస్. హరనాథరావు

13. అపురూప కళారూపాల విధ్వంసదశ్యం యక్షగానము (సమీక్షా వ్యాసం) డా.॥ కందిమళ్ళ సాంబశివరావు

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విషయ సూచిక

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A Course in Reading & Writing Skills

Learning Outcomes

By the end of the course the learner will be able to:

- Use reading skills effectively
- Comprehend different texts
- Interpret different types of texts
- Analyse what is being read
- Build up a repository of active vocabulary
- Use good writing strategies
- Write well for any purpose
- Improve writing skills independently for future needs

Unit-1

Prose : 1. How to Avoid Foolish Opinions Bertrand Russell

Skills : 2. Vocabulary: Conversion of Words

: 3. One Word Substitutes

: 4. Collocations

Unit-2

Prose	: 1. The Doll's House	Katherine Mansfield
Poetry	: 2. Ode to the West Wind	P B Shelley
Non-Detailed Text	: 3. Florence Nightingale	Abrar Mohsin
Skills	: 4. Skimming and Scanning	

Unit-3

Prose : 1. The Night Train at Deoli Ruskin Bond

Poetry : 2. Upagupta Rabindranath Tagore

Skills : 3. Reading Comprehension

: 4. Note Making/Taking

Unit-4

Poetry : 1. Coromandel Fishers Sarojini Naidu

Skills : 2. Expansion of Ideas

: 3. Notices, Agendas and Minutes

Unit-5

Non-Detailed Text : 1. An Astrologer's Day R K Narayan

Skills : 2. Curriculum Vitae and Resume

: 3. Letters

: 4. E-Correspondence

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A Course in Reading & Writing Skills

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Life Skill Course

Indian Culture & Science

As per Choice Based Credit System (CBCS)
Common to all Branches

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Indian Culture & Science

Learning Outcomes

By successful completion of the course, students will be able to:

1. Understand the evolution of India's culture.
2. Analyze the process of modernization of Indian society and culture from past to future.
3. Comprehend objective education and evaluate scientific development of India in various spheres.
4. Inculcate nationalist and moral fervor and scientific temper.

Unit-I: Unity in Diversity in India

Coexistence of various religions since ancient times - Hinduism, Buddhism, Jainism and Atheism, and later Sikhism, Islam and Christianity

The Bhakti (Vishnavite and Saivaite) and Sufi Movements

The concepts of seela, karuna, kshama, maitri, vinaya, santhi and ahimsa Achievements in Literature, Music, Dance, Sculpture and Painting - Craftsmanship in cloth, wood, clay, metal and ornaments

Cultural diversity, Monogamy, Family system, Important seasonal festivals

Unit-II: Social Reforms and Modern Society

Reforms by Basaveswara - Raja Rama Mohan Roy - Dayananda Saraswathi - Swamy Vivekananda - Mahatma Gandhi - B. R. Ambedkar - Reforms in Andhra by Vemana,Veerabrahmam, Gurajada, Veeresalingam and GurramJashua (only reforms in brief, biographies not needed)

Modern Society: Family unity, Community service, Social Harmony, Civic Sense, Gender Sensitivity, Equality, National Fervor

Unit-III: Science and Technology

Objectivity and Scientific Temper - Education on Scientific lines (Bloom's Taxonomy) - Online Education

Developments in Industry, Agriculture, Medicine, Space, Alternate Energy, Communications, Media through ages

Co-curricular Activities Suggested

1. Assignments, Group discussions, Quiz etc
2. Invited Lecture by a local expert
3. Visit to a scientific institutions, local heritage sites, museums, industries etc

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Indian Culture & Science

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Skill Development Course

Advertising

As per Choice Based Credit System (CBCS)
Common to all Branches

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Advertising

Learning Outcomes

After Successful completion of this course, the students are able to;

1. Understand the field of Advertising
2. Comprehend opportunities and challenges in Advertising sector
3. Prepare a primary advertising model
4. Understand applying of related skills
5. Examine the scope for making advertising a future career

Unit-1

Introduction of advertising concepts- functions - Types of advertising - Creative advertising messages - Factors determining opportunities of a product/service/Idea

Unit-2

Role of advertising agencies and their responsibilities - scope of their work and functions - Ethical issues - Identifying target groups -Laws in advertising. Advertising Statutory Bodies in India - Role of AAAI (Advertising Agencies Association of India), ASCI (Advertising Standard Council of India)

Unit-3

Types of advertising - Basic characteristics of a typical advertisement - Reaching target groups - Local advertising - Feedback on impact of advertisement - Business promotion.

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Advertising

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Three Dimensional Analytical Solid Geometry

As per Choice Based Credit System (CBCS)

I - B.Sc(Mathematics) / II - Semester

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Three Dimensional Analytical Solid Geometry

Course Outcomes: After successful completion of this course, the student will be able to;

1. Get the knowledge of planes.
2. Basic idea of lines, sphere and cones.
3. Understand the properties of planes, lines, spheres and cones.
4. Express the problems geometrically and then to get the solution.

Unit-I: The Plane

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

Unit-II: The Line

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

Unit-III: The Sphere

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes;

Unit-IV: The Sphere and Cones

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified from of the equation of two spheres.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone;

Unit-V: Cones

Enveloping cone of a sphere; right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle: Condition that a cone may have three mutually perpendicular generators; intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.

Reference Books

1. A text book of Mathematics for BA/B.Sc Vol 1, by V Krishna Murthy & Others, published by S. Chand & Company, New Delhi.
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.
3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.
4. Solid Geometry by B.Rama Bhupal Reddy, published by Spectrum University Press.

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Wave Optics

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Wave Optics

Unit-I: Aberrations

Introduction - monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration-the achromatic doublet. Removal of chromatic aberration of a separated doublet. Achromatism for two lenses (i)in contact and (ii) separated by a distance.

Unit-II: Interference of Light

Principle of superposition - coherence-temporal coherence and spatial coherence-conditions for interference of light. Interference by division of wave front: Fresnel's biprism-determination of wavelength of light. Determination of thickness of a transparent material using Biprism, change of phase on reflection, Lloyd's mirror experiment. Interference by division of amplitude: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (cosine law) colors of thin films- Non-reflecting films, Interference by a plane parallel illuminated by a point source-Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film). Determination of diameter of wire, Newton's rings in reflected light with and without contact between lens and glass plate, Newtons's rings in transmitted light (Haidinger Fringes)-Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer. Types of fringes-Determination of wavelength of monochromatic light, Difference in wavelength of Sodium D1, D2 lines and thickness of a thin transparent plate.

Unit-III: Diffraction of Light

Introduction, distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction – Diffraction due to single slit and Circular aperture-Limit of Resoultion-Fraunhoffer diffraction due to double slit-Fraunhoffer diffraction pattern with N slits (diffraction grating). Resolving power of grating, Determination of wavelength of light in normal and oblique incidence methods using and minimum deviation methods using diffraction grating.

Fresnel's Diffraction: Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-phase reversal zone plate, diffraction at a straight edge-difference between interference and diffraction.

Unit-IV: Polarisation of Light

Polarized light: Methods of polarization polarization by reflection, refraction, double refraction, selective absorption scattering of light-Brewster's law-Mauls law-Nicol prism polarizer and analyzer- Refraction of plane wave incident on negative and positive crystals (Huygen's explanation)-Quarter wave plate, Half wave plate-optical activity, determination of specific rotation by Laurent's half shade polarimeter-Babinet's compensator - idea of elliptical and circular polarization

Unit-V: Lasers and Holography

Lasers: Introduction, spontaneous emission, stimulated emission. Population Inversion, Laser principle-Einstein coefficients-Types of lasers-He-Ne laser, Ruby laser- Applications of lasers.

Holography: Basic principle of holography-Gabor hologram and its limitations, Applications of holography.

Unit-6: Fiber Optics

Introduction- optical fibers, different types of fibers, Step and graded index fibers, rays and modes in an optical fiber, fiber material, principles of fiber communication (qualitative treatment only), advantages of fiber optic communication.

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Data Structures using C

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Data Structures using C

Learning outcomes of Course

Upon successful completion of the course, a student will be able to:

1. Understand available Data Structures for data storage and processing.
2. ComprehendData Structure and their real-time applications - Stack, Queue, Linked List, Trees and Graph.
3. Choose a suitable Data Structures for an application.
4. Develop ability to implement different Sorting and Search methods.
5. Have knowledge onData Structures basic operations like insert, delete, search,update and traversal.
6. Design and develop programs using various data structures.
7. Implement the applications of algorithms for sorting, pattern matching etc.

Unit-I

Introduction to Data Structures: Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages

Principles of Programming and Analysis of Algorithms: Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big 'O' Notation, Algorithm Analysis, Structured Approach to Programming, Recursion, Tips and Techniques for Writing Programs in 'C'

Unit-II

Arrays: Introduction to Linear and Non- Linear Data Structures, One- Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers

Linked Lists: Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays

Unit-III

Stacks: Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion.

Queues: Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues

UnitIV

Binary Trees: Introduction to Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Counting Number of Binary Trees, Applications of Binary Tree

Unit-V

Searching and sorting: Sorting - An Introduction, Bubble Sort, Insertion Sort, Merge Sort, Searching - An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search

Graphs: Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs.

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సృజనాత్మక రచన

డిగ్రీ (జనరల్) / సెమిస్టర్ - III

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జనరల్ తెలుగు / సెమిస్టర్ - III

సృజనాత్మక రచన

అభ్యసన ఫలితాలు

ఈ కోర్సు విజయవంతం ముగించాక, విద్యార్థులు క్రింది అభ్యసన ఫలితాలను పొందగలరు.

1. తెలుగు సాహిత్య అభ్యసన ద్వారా నేర్చుకున్న నెపుణ్యాలను, సృజనాత్మక నైపుణ్యాలుగా మార్చుకోగలరు.
2. విద్యార్థులు భాషాతత్వాన్ని, భాష యొక్క ఆవశ్యకతను, భాష యొక్క ప్రాధాన్యాన్ని గుర్తిస్తారు. మనిషి వ్యక్తిగత జీవనానికి, సామాజిక వ్యవస్థ పటిష్టతకు భాష ప్రధానమని తెలుసుకుంటారు.

   తెలుగుభాషలోని కీలకాంశాలైన 'వర్ణం–పదం–వాక్యా'ల ప్రాధాన్యాన్ని గుర్తిస్తూ, వాగ్రూప– లిఖితరూప వ్యక్తీకరణ ద్వారా భాషానైపుణ్యాలను మొరుగుపరచుకోగలరు.
3. భాషానైపుణ్యాలను అలవరుచుకోవడంతోపాటు వినియోగించడం నేర్చుకుంటారు. రచనా, భాషణానైపుణ్యాలను సృజనాత్మక రూపంలో వ్యక్తీకరించగలరు.
4. ప్రాచీన పద్యరచనతో పాటు ఆధునిక కవిత, కథ, వ్యాసం మొదలైన సాహిత్యప్రక్రియల నిర్మాణాలకు సంబంధించిన సిద్ధాంతవిషయాలను నేర్పడంతో పాటు వారిలో రచనా నైపుణ్యాలను పెంపొందించుకోగలరు.
5. సృజన రంగర, ప్రసారమాధ్యమ రంగాల్లో ఉపాధి అవకాశాలను అందిపుచ్చుకోగలరు.
6. అనువాద రంగంలో నైపుణ్యం సంపాదించగలరు.

పాఠ్య ప్రణాళిక

యూనిట్ - 1: వ్యక్తీకరణ నైపుణ్యం

1. భాషా ప్రాథమిక అంశాలు : (భాష– నిర్వచనం, లక్షణాలు, ఆవశ్యకత ప్రయోజనాలు)
2. వర్ణం, పదం, వాక్యం : (లక్షణాలు, సామాన్య– సంయుక్త– సంశ్లిష్ట వాక్యాలు)
3. భాషా నిర్మాణంలో వర్ణం, పదం, వాక్యం

యూనిట్ - II : సృజనాత్మక రచనలు

4. కవితా రచన : ఉత్తమ కవితా – లక్షణాలు
5. కథారచన : ఉత్తమ కథ – లక్షణాలు
6. వ్యాస రచన : ఉత్తమ వ్యాసం లక్షణాలు

యూనిట్ - III: అనువాద రచన

7. అనువాదం– నిర్వచనం, అనువాద పద్ధతులు

8. అనువాద సమస్యలు – భౌగోళిక, భాషా, సంస్కృతిక సమస్యలు, పరిష్కారాలు

9. అభ్యాసం - ఆంగ్లం నుండి తెలుగుకు, తెలుగు నుండి ఆంగ్లానికి ఒక పేరును అనువదించడం

యూనిట్ - IV: మాధ్యమాలకు రచన - 1 (ముద్రణామాధ్యమం/ ప్రింట్ మీడియా)

10. ముద్రణామాధ్యమం: పరిచయం – పరిధి – వికాసం

11. వివిధ రకాల పత్రికలు , పరిశీలన – పత్రికా భాష – శైలి – వైవిధ్యం

12. పత్రికా రచన : (వార్తా రచన, సంపాదకీయాలు, సమీక్షలు – అవగాహన)

యూనిట్ - V: మాధ్యమాల రచన - 2 (ప్రసార మాధ్యమం/ ఎలక్ట్రానిక్ మీడియా)

13. ప్రసార మాధ్యమాలు : (నిర్వచనం,రకాలు, విస్తృతి ప్రయోజనాలు)

14. శ్రవణ మాధ్యమాలు : (రచన, రేడియో రచన, ప్రసంగాలు, నాటికలు, ప్రసార సమాచారం)

15. దృశ్య మాధ్యమాలు : (రచన, వ్యాఖ్యానం(యాంకరింగ్), టెలివిజన్ రచన)

విషయ సూచిక
సృజనాత్మక రచన

యూనిట్ - 1: వ్యక్తీకరణ నైపుణ్యం

1. భాషా ప్రాథమిక అంశాలు

1.1 ఉద్దేశ్యం **3**
1.2 పాఠ్యభాగం **3**
1.3 పాఠ్యభాగ పరిచయం **10**
1.4 పాఠ్యభాగ సారాంశము **10**
1.5 **వ్యాసరూప ప్రశ్నలు** **12**
1.6 సంగ్రహ ప్రశ్నలు **14**

2. వర్ణం, పదం, వాక్యం

2.1 ఉద్దేశ్యం **17**
2.2 పాఠ్యభాగం **17**
2.3 పాఠ్యభాగ పరిచయం **21**
2.4 పాఠ్యభాగ సారాంశము **21**
2.5 **వ్యాసరూప ప్రశ్నలు** **21**
2.6 సంగ్రహ ప్రశ్నలు **23**

3. భాషా నిర్మాణంలో వర్ణం, పదం, వాక్యం

3.1 ఉద్దేశ్యం **25**
3.2 పాఠ్యభాగం **25**
3.3 పాఠ్యభాగ పరిచయం **32**
3.4 పాఠ్యభాగ సారాంశము **32**
3.5 **వ్యాసరూప ప్రశ్నలు** **32**
3.6 సంగ్రహ ప్రశ్నలు **38**
3.7 విద్యార్థులకు అభ్యాసం **42**

యూనిట్ - II : సృజనాత్మక రచనలు

4. కవితా రచన

4.1 ఉద్దేశ్యం **45**
4.2 పాఠ్యభాగం **45**
4.3 పాఠ్యభాగ పరిచయం **48**

4.4 పాఠ్యభాగ సారాంశము 48
4.5 వ్యాసరూప ప్రశ్నలు 49
4.6 సంగ్రహ ప్రశ్నలు 52

5. కథారచన

5.1 ఉద్దేశ్యం 55
5.2 పాఠ్యభాగం 55
5.3 పాఠ్యభాగ పరిచయం 60
5.4 పాఠ్యభాగ సారాంశము 61
5.5 వ్యాసరూప ప్రశ్నలు 61
5.6 సంగ్రహ ప్రశ్నలు 66
5.7 విద్యార్థులకు అభ్యాసం 70

6. వ్యాస రచన

6.1 ఉద్దేశ్యం 55
6.2 పాఠ్యభాగం 55
6.3 పాఠ్యభాగ పరిచయం 60
6.4 పాఠ్యభాగ సారాంశము 61
6.5 వ్యాసరూప ప్రశ్నలు 61
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6.7 విద్యార్థులకు అభ్యాసం 70
6.8 ప్రాజెక్టు వర్క్ 80

యూనిట్ - III: అనువాద రచన

7. అనువాదం

7.1 ఉద్దేశ్యం 83
7.2 పాఠ్యభాగం 83
7.3 పాఠ్యభాగ పరిచయం 86
7.4 పాఠ్యభాగ సారాంశము 86
7.5 వ్యాసరూప ప్రశ్నలు 86
7.6 సంగ్రహ ప్రశ్నలు 91
7.7 విద్యార్థులకు అభ్యాసం 92

8. అనువాద సమస్యలు

8.1 ఉద్దేశ్యం 93
8.2 పాఠ్యభాగం 93

8.3 పాఠ్యభాగ పరిచయం 104
8.4 పాఠ్యభాగ సారాంశము 104
8.5 వ్యాసరూప ప్రశ్నలు 104
8.6 సంగ్రహ ప్రశ్నలు 117
8.7 విద్యార్థులకు అభ్యాసం 118

9. అభ్యాసం

9.1 ఉద్దేశం 119
9.2 ఆంగ్లం నుండి తెలుగుకు అనువాదం చేయుట 119
9.3 తెలుగు నుండి ఆంగ్లంకు అనువాదం చేయుట 120
9.4 విద్యార్థులకు అభ్యాసం 120

యూనిట్ - IV: మాధ్యమాలకు రచన - 1 (ముద్రణామాధ్యమం/ ప్రింట్ మీడియా)

10. ముద్రణామాధ్యమం

10.1 ఉద్దేశ్యం 123
10.2 పాఠ్యభాగం 123
10.3 పాఠ్యభాగ పరిచయం 126
10.4 పాఠ్యభాగ సారాంశము 126
10.5 వ్యాసరూప ప్రశ్నలు 127
10.6 సంగ్రహ ప్రశ్నలు 129
10.7 విద్యార్థులకు అభ్యాసం 130

11. వివిధ రకాల పత్రికలు

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11.2 పాఠ్యభాగం 131
11.3 పాఠ్యభాగ పరిచయం 137
11.4 పాఠ్యభాగ సారాంశము 138
11.5 వ్యాసరూప ప్రశ్నలు 138
11.6 సంగ్రహ ప్రశ్నలు 142
11.7 విద్యార్థులకు అభ్యాసం 144

12. పత్రికా రచన

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12.2 పాఠ్యభాగం 145
12.3 పాఠ్యభాగ పరిచయం 149

12.4 పాఠ్యభాగ సారాంశము 149
12.5 వ్యాసరూప ప్రశ్నలు 150
12.6 సంగ్రహ ప్రశ్నలు 152
12.7 విద్యార్థులకు అభ్యాసం 154

యూనిట్ - V: మాధ్యమాల రచన - 2 (ప్రసార మాధ్యమం/ ఎలక్ట్రానిక్ మీడియా)

13. ప్రసార మాధ్యమాలు

13.1 ఉద్దేశ్యం 157
13.2 పాఠ్యభాగం 157
13.3 పాఠ్యభాగ పరిచయం 159
13.4 పాఠ్యభాగ సారాంశము 159
13.5 వ్యాసరూప ప్రశ్నలు 159
13.6 సంగ్రహ ప్రశ్నలు 161
13.7 విద్యార్థులకు అభ్యాసం 162

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14.3 పాఠ్యభాగ పరిచయం 170
14.4 పాఠ్యభాగ సారాంశం 170
14.5 వ్యాసరూప ప్రశ్నలు 170
14.6 సంగ్రహ ప్రశ్నలు 175
14.7 విద్యార్థులకు అభ్యాసం 176

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15.2 పాఠ్యభాగం 177
15.3 యాంకరకు ఉండాల్సిన లక్షణాలు 182
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A Course in

Conversational Skills

As per Choice Based Credit System (CBCS)
For Degree I - Year / III - Semester
Common to all Branches

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A Course in Conversational Skiils

Learning Outcomes

By the end of the course the learner will be able to:

- Speak fluently in English
- Participate confidently in any social interaction
- Face any professional discourse
- Demonstrate critical thinking
- Enhance conversational skills by observing the professional interviews

Unit-I

Speech: 1. Tryst with Destiny Jawaharlal Nehru

Skills: 2. Greetings

3. Introductions

Unit-II

Speech: 1. Yes, We Can Barack Obama

Interview: 2. A Leader Should Know How to Manage Failure Dr.A.P.J.Abdul Kalam/ India Knowledge at Wharton

Skills: 3. Requests

Unit-III

Interview: 1. Nelson Mandela's Interview With Larry King

Skills: 2. Asking and Giving Information

3. Agreeing and Disagreeing

Unit-IV

Interview: 1. JRD Tata's Interview With T.N.Ninan

Skills: 2. Dialogue Building

3. Giving Instructions/Directions

Unit-V

Speech: 1. You've Got to Find What You Love Steve Jobs

Skills: 2. Debates

3. Descriptions

4. Role Play

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Life Skill Course

Environmental Education

As per Choice Based Credit System (CBCS)
Common to all Branches

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Environmental Education

Learning outcomes

On completion of this course the students will be able to …..

1. Understand the nature, components of an ecosystem and that humans are an integral part of nature.
2. Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.
3. Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.
4. Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
5. Acquaint with international agreements and national movements, and realize citizen's role in protecting environment and nature.

Unit-1: Environment and Natural Resources

1. Multidisciplinary nature of environmental education; scope and importance.
2. Man as an integral product and part of the Nature.
3. A brief account of land, forest and water resources in India and their importance.
4. Biodiversity: Definition; importance of Biodiversity - ecological, consumptive, productive, social, ethical and moral, aesthetic, and option value.
5. Levels of Biodiversity: Genetic, species and ecosystem diversity.

Unit-2: Environmental Degradation and Impacts

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. **Deforestation:** Causes and effects due to expansion of agriculture, firewood, mining, forest fires and building of new habitats.
4. Non-renewable energy resources, their utilization and influences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Green house effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities and agriculture.

7. **Threats to biodiversity:** Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

Unit-3: Conservation of Environment

1. Concept of sustainability and sustainable development with judicious use of land, water and forest resources; afforestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. **Solid waste management:** Control measures of urban and industrial waste.
4. **Conservation of biodiversity:** In-situ and ex-situ conservation of biodiversity.
5. **Environment Laws:** Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
6. **International agreements:** Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, Silent valley.

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Life Skill Course

Personality Enhancement & Leadership

As per Choice Based Credit System (CBCS)
Common to all Branches

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Personality Enhancement & Leadership

Learning Outcomes

By successful completion of the course, students will be able to:

- Develop comprehensive understanding of personality
- Know how to assess and enhance one's own personality
- Comprehend leadership qualities and their importance
- Understand how to develop leadership qualities

Unit-I

Meaning of Personality – Explanations of Human Personality – Psychodynamic Explanations – Social Cognitive Explanation – Big Five traits of Personality

Unit-II

Assessment of Personality - Projective& Self Report Techniques - Building Self-Confidence – Enhancing Personality Skills

Unit-III

Leadership Characteristics – Types of Leaders – Importance of Leadership – Leadership Skills – Building and Leading Efficient Teams – Leadership Qualities of Abraham Lincoln, mahatma Gandhi, Prakasam Pantulu, Dr. B. R. Ambedkar & J.R.D.Tata

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Personality Enhancement & Leadership

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Skill Development Course

Disaster Management

As per Choice Based Credit System (CBCS)
Common to all Branches

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Disaster Management

Learning Outcomes

After successful completion of the course, the students are able to;

1. Understand the nature, cause and effects of disasters
2. Comprehend the importance of Disaster Management and the need of awareness
3. Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions
4. Volunteer in pre and post disaster management service activities

Unit-I

Introduction of Disaster - Different types of disasters- Natural- (flood, cyclone, earthquake, Famine and pandemic) - Accidental- (Fire, Blasting, Chemical leakage, Rail, Aviation, Road boat tragedies and nuclear pollution) - Disaster Management Act 2005

Unit-II

Causes and immediate effects of Disasters - Preparedness of disasters –Precautions – Dissemination of information - Nature and concepts - Role of National Disaster Management Authority and Role of Government and non governmental organizations in protecting human livestock and natural resources.-Use of technology -Role of Citizens and Youth in the prevention.

Unit-III

Post disaster effects - short term - Procedures for Rehabilitation and Recovery - Role of volunteers and Safety Precautions - Long term remedial and preventive measures – Collection, filing and storage of information - Case studies.

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Abstract Algebra and Real Analysis

As per Choice Based Credit System (CBCS)

I - B.Sc(Mathematics) / III - Semester

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PAPER - III: Abstract Algebra and Real Analysis

UNIT - I

GROUPS : Binary operations-Definitions and properties, Groups-Definition and elementary properties, Finite groups and group composition tables, Subgroups and cyclic subgroups. Permutations-Functions and permutations ,groups of permutations, cycles and cyclic notation, even and odd permutations, The alternating groups. Cyclic groups - Elementary properties ,The classification of cyclic groups , sub groups of finite cyclic groups. Isomorphism - Definition and elementary properties, Cayley's theorem, Groups of cosets, Applications, Normal subgroups - Factor groups , Criteria for the existence of a coset group, Inner automorphisms and normal subgroups, factor groups and simple groups, Homomorphism- Definition and elementary properties, The fundamental theorem of homomorphisms, applications.

UNIT - II

RINGS: Definition and basic properties, Fields, Integral domains, divisors of zero and Cancellation laws, Integral domains, The characteristic of a ring, some non – commutative rings, Examples, Matrices over a field, The real quaternions ,Homomorphism of Rings - Definition and elementary properties, Maximal and Prime ideals, Prime fields. Rings of Polynomials – Polynomials in an indeterminate form, The evaluation of homomorphism.

UNIT – III

REAL NUMBERS: The Completeness Properties of R, Applications of the Supremum Property.

Sequences and Series - Sequences and their limits, limit theorems, Monotonic Sequences, Sub-sequences and the Bolzano-Weirstrass theorem,The Cauchy's Criterion, Properly divergent sequences, Introduction to series, Absolute convergence, test for absolute convergence, test for non-absolute convergence.

Continuous Functions-continuous functions, combinations of continuous functions, continuous functions on intervals, Uniform continuity.

UNIT – IV

DIFFERENTIATION AND INTEGRATION: The derivative, The mean value theorems, L'Hospital Rule, Taylor's Theorem.

Riemann integration - Riemann integral, Riemann integrable functions, Fundamental theorem.

***

ELECTRICITY, MAGNETISM AND ELECTRONICS

As per Choice Based Credit System (CBCS)

II - B.Sc(Physics) / III - Semester

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B.Sc. (Physics)
PAPER - III: Electricity, Magnetism and Electronics

UNIT- I

Unit – I **23 hrs**

1. Electrostatics (10 periods)

Gauss law and its applications-Uniformly charged sphere, charged cylindrical conductor and an infinite conducting sheet of charge. Deduction of Coulmb's law from Gauss law Mechanical force on a charged conductor Electric potential Potential due to a charged spherical conductor, , electric field strength from the electric dipole and an infinite line of charge. Potential of a uniformly charged circular disc.

2. Dielectrics (5 periods)

An atomic view of dielectrics, potential energy of a dipole in an electric field. Polarization and charge density, Gauss's law for dielectric medium Relation between D,E, and P. Dielectric constant, susceptibility and relation between them. Boundary conditions at the dielectric surface. Electric fields in cavities of a dielectric-needle shaped cavity and disc shaped cavity.

3. Capacitance (8 periods)

Capacitance of concentric spheres and cylindrical condenser, capacitance of parallel plate condenser with and without dielectric. Electric energy stored in a charged condenser – force between plates of condenser, construction and working of attracted disc electrometer, measurement of dielectric constant and potential difference.

Unit – II

1. Magnetostatics (6 periods)

Magnetic shell potential due to magnetic shell field due to magnetic shell equivalent of electric circuit and magnetic shell Magnetic induction (B) and field (H) permeability and susceptibility Hysteresis loop.

2. Moving charge in Electric and Magnetic Field (8 periods)

Hall effect, cyclotron, synchrocyclotron and synchrotron force on a current carrying conductor placed in a magnetic field, force and torque on a current loop, Biot Savart's law and calculation of B due to long straight wire, a circular current loop and solenoid.

3. Electromagnetic Induction (10 periods)

Faraday's law Lenz's law expression for induced emf time varying magnetic fields Betatron Ballistic galvanometer theory damping correction self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid toroid energy stored in magnetic field transformer Construction, working, energy losses and efficiency.

Unit – III

1. Varying and Alternating Currents (10 periods)

Growth and decay of currents in LR, CR and LCR circuits Critical damping. Alternating current relation between current and voltage in pure R,C and L-vector diagrams Power in ac circuits. LCR series and parallel resonant circuit Q-factor. AC & DC motors-single phase, three phase (basics only).

2. Maxwell's Equations and Electromagnetic Waves (10 periods)

A review of basic laws of electricity and magnetism displacement current Maxwell's equations in differential form Maxwell's wave equation, plane electromagnetic waves Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves (Hertz experiment)

Unit – IV

1. Basic Electronics (15 periods)

Formation of electron energy bands in solids, classification of solids in terms of forbidden energy gap. Intrinsic and extrinsic semiconductors, Fermi level, continuity equation p-n junction diode, Zener diode characteristics and its application as voltage regulator. Half wave and full wave rectifiers and filters, ripple factor (quantitative) p n p and n p n transistors, current components in transistors, CB,CE and CC configurations transistor hybrid parameters determination of hybrid parameters from transistor characteristics transistor as an amplifier concept of negative feed back and positive feed back Barkhausen criterion, RC coupled amplifier and phase shift oscillator (qualitative).

2. Digital Principles (8 periods)

Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1's and 2's complement methods). Hexadecimal number system. Conversion from Binary to Hexadecimal – vice versa and Decimal to Hexadecimal vice versa.

Logic Gates: OR,AND,NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive OR gate, De Morgan's Laws statement and proof, Half and Full adders. Parallel adder circuits.

NOTE: Problems should be solved from every chapter of all units.

***

Database Management Systems

As per Choice Based Credit System (CBCS)

II- B.Sc(Computer Science) / III - Semester

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Database Management Systems

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LINEAR PROGRAMMING

As per Choice Based Credit System (CBCS)

I - B.Sc(Mathematics) / I V- Semester

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PAPER - IV: Linear Programming

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Unit-2

Simplex Method: Introduction, Definitions and notations, Computational procedure of simplex algorithm, Simple way for simplex computations, Artificial variables, Two-phase method, Alternative method of two –phase simplex method, Big-M method, Degeneracy in LPP and method to solve to resolve degeneracy, Alternative solutions, Unbounded solutions, Non-existing feasible solutions, Solutions of simultaneous equations by simplex method

Unit-3

Duality in Linear Programming and Dual Simplex Method: Introduction**,**Definition of Dual problems, General rules for converting any primal into its Dual ,Relation between the solution of primal and Dual problem, Initial Solution for Dual Simplex Method, Dual Simplex Method.

Unit-4

Assignment Problems: Introduction, Mathematical formulation of Assignment problem, Reduction theorem, Hungarian Method for solving Assignment problem, Unbalanced assignment problem,The traveling salesman problem, Formulation of travelling salesman problem as an Assignment problem and Solution procedure

Unit-5

Transportation Problems

Mathematical formulation of Transportation problem,Tabular Representation,Definitions, Special structure of the solution, North-west corner rule, Lowest cost entry method, Vogel's approximation method, Optimality in transportation Problem,Degeneracy in transportation problems Resolution of degeneracy, Unbalanced transportation problem, Generalized transportation problem

***

Modern Physics

As per Choice Based Credit System (CBCS)
II - B.Sc(Physics) / IV - Semester

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B.Sc. (Physics)
PAPER - IV: Modern Physics

Unit – I **25 hrs**

Atomic Spectra: Introduction Drawbacks of Bohr's atomic model Sommerfeld's elliptical orbits relativistic correction (no derivation). Stern & Gerlach experiment Vector atom model and quantum numbers associated with it. L-S and j-j coupling schemes. Spectral terms, selection rules, intensity rules. Spectra of alkali atoms, doublet fine structure. Alkaline earth spectra, singlet and triplet fine structure. Zeeman Effect, Paschen-Back Effect and Stark Effect (basic idea).

Molecular Spectroscopy: Types of molecular spectra, pure rotational energies and spectrum of diatomic molecule, determination of internuclear distance. Vibrational energies and spectrum of diatomic molecule. Raman effect, Classical theory of Raman effect. Experimental arrangement for Raman effect and its applications.

Unit – II **25 hrs**

Quantum Mechanics

Inadequacy of classical Physics: (Discussion only): Spectral radiation Planck's law. Photoelectric effect Einstien's photoelectric equation. Compton's effect (quantitative) experimental verification. Stability of an atom Bohr's atomic theory. Limitations of old quantum theory.

Matter Waves: de Broglie's hypothesis wavelength of matter waves, properties of matter waves. Phase and group velocities. Davisson and Germer experiment. Double slit experiment. Standing de Brogile waves of electron in Bohr orbits.

Uncertainty Principle: Heisenberg's uncertainty principle for position and momentum (x and p_x), Energy and time (E and t). Gamma ray microscope. Diffraction by a single slit. Position of electron in a Bohr orbit. Particle in a box. Complementary principle of Bohr.

Schrodinger Wave Equation: Schrodinger time independent and time dependent wave equations. Wave function properties Significance. Basic postulates of quantum mechanics. Operators, eigen functions and eigen values, expectation values. Application of Schrodinger wave equation to particle in one and three dimensional boxes, potential step and potential barrier.

Unit – III **15 hrs**

Nuclear Physics

Nuclear Structure: Basic properties of nucleus size, charge, mass, spin, magnetic dipole moment and electric quadrupole moment. Binding energy of nucleus, deuteron binding energy, p-p and n-p scattering (concepts), nuclear forces. Nuclear models liquid drop model, shell model.

Alpha and Beta Decays: Range of alpha particles, Geiger Nuttal law. Gammow's theory of alpha decay. Geiger Nuttal law from Gammow's theory. Beta spectrum neutrino hypothesis, Fermi's theory of b-decay (qualitative).

Nuclear Reactions: Types of nuclear reactions, channels, nuclear reaction kinematics. Compound nucleus, direct reactions (concepts).

Nuclear Detectors : GM counter, proportional counter, scintillation counter, Wilson cloud chamber and solid state detector.

Unit – IV **25 hrs**

Solid State Physics

Crystal Structure: Crystalline nature of matter. Cystal lattice, Unit Cell, Elements of symmetry. Crystal systems, Bravais lattices. Miller indices. Simple crystal structures (S.C., BCC, CsCl, FCC, NaCl diamond and Zinc Blends)

X-ray Diffraction: Diffraction of X –rays by crystals, Bragg's law, Experimental techniques - Laue's method and powder method.

Nanomaterials: Introduction, nanoparticles, metal nanoclusters, semiconductor nanoparticles, carbon clusters, carbon nanotubes, quantum nanostructures nanodot, nanowire and quantum well. Fabrication of quantum nanostructures.

Bonding in Crystals: Types of bonding in crystals characteristics of crystals with different bindings. Lattice energy of ionic crystals determination of Medelung constant for NaCl crystal, calculation of Born coefficient and repulsive exponent. Born Haber cycle.

Magnetism: Magnetic properties of dia, para and ferromagnetic materials. Langevin's theory of paramagnetism. Weiss' theory of ferromagnetism –Concepts of magnetic domains, antiferromagnetism and ferrimagnetism ferrites and their applications.

Super Conductivity

Basic experimental facts zero resistance, effect of magnetic field, Meissner effect, persistent current, Isotope effect Thermodynamic properties, specific heat, entropy. Type I and Type II superconductors.

Elements of BCS theory-Cooper pairs. Applications. High temperature superconductors (general information)

NOTE: Problems should be solved from every chapter of all units.

JAVA PROGRAMMING

As per Choice Based Credit System (CBCS)

II- B.Sc (Computer Science) / IV - Semester

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JAVA PROGRAMMING

Unit-1

Introduction to OOP, Procedural Programming Language and Object Oriented Language, principles of OOP, Applications of OOP, History of JAVA, JAVA features, JVM, program Structure. Variables, Primitive Data Types, Identifiers, Literals, Operators, Expressions, Precedence Rules and Associativity, Primitive Type Conversion and Casting, Flow of Control. Classes and Objects, Class declaration, Creating Objects, Methods, Method Overloading.

Unit-II

Constructor, Overloading, Garbage Collector, Importance of Static Keyword and this keywords, Examples, Arrays, Command Line Arguments, Nested Classes.

Inheritance & Polymorphism: Basic concepts of Inheritance, Member access, forms of inheritance- specialization, specification, construction, extenssion, limitation, combination, benefits of inheritance, Relationship, Creating Multilevel Hierarchy, super uses, using final with Inheritance, Polymorphism, Runtime polymorphism, pure polymorphism, method overriding, abstract classes & Methods, Object class

Packages: Defining a Package, PATH, CLASSPATH, Difference between PATH and CLASS PATH, Access protection, importing packages.

Unit-III

Interfaces: Defining an interface, implementing interfaces, Nested interfaces, variables in interfaces and extending interfaces, Multiple inheritances of interfaces, Difference between Abstract class & Interfaces.

Exception handling: Fundamentals of exception handing, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

Multithreading: Thread Introduction, Differences between thread-based multitasking and process-based multitasking, Thread life cycle, creating threads using Thread class and Runnable Interface, Thread Priorities, synchronizing threads, inter thread communication.

Unit-IV

Files: Reading data from files and writing data to files, Random Access File

Applet: Applet class, Applet structure, Applet life cycle, Sample Applet programs. Event handling: Event delegation model, Sources of event, Event Listeners, Adapter classes, Inner classes.

JAVA PROGRAMMING

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